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DATA STATEMENTS



Welcome to the 64C

Commodore's long awaited and much trumpeted 64C has finally been released in a class: Commodore 64C packs a ton for the Christmas rush.

Billed as a new personal computer for home schools and business, Commodore discloses its design as pioneering and its volume (16C

units as the 128k) as eye-opening, more and more.

Devised as completely compatible with the C64 (and believed to be a C64 with a face lift) by many in the know, Commodore claims buyers of the new machine will have access to the largest software base in the world.

Commodore's aim in launching the new machine is to use it to form the basis of a second generation of operating methods and facilities, completely new to the home computer market place.

Commodore's Chris Masley commented: "The varied business and home computer audience at this (C/W) show has inspired the product to the broadest potential ever been possible. Their critical reaction holds well for more associated games and computers in the computer industry, it makes who ever gets to sell it and software developers who will enjoy the challenge of producing new packages to exploit its facilities."

The 64C has been launched as a package including games and a program under the label Commodore's Collection. The exact contents of the package are as follows: the 64C, plus cassette unit, mouse and three colour graphics software: Pitfall, Topspin, Turm, plus computer versions of the board games Monopoly, Scrabble, Cluedo, Chess and Reversi.

The price of the Commodore's Collection is £299.99.

Facsimile
Commodore UK / Watlington Road
Widley, Cusby, Berkshire
Tel: 01535 207033

Get Up and Go

The ever popular sport games market is still producing new titles.

The latest from the MS Gold stable are Super Cycle (89p) and Go for Gold (Aussians).

Super Cycle is a motorcycle simulation; your machine via 150cc job and the game gets you and your bike across the road, curves, over jumps and of course, the clock. First choose your machine and leathers, then design your jersey. There are deadly obstacles for you to negotiate as you speed your way around the circuit, water, oil and oil make the going tough as never before. A realistic instrument panel helps you get the best from your machine using the Tachometer and speedometer. Super Cycle is available



David Sachs of the 21st Century

DATA STATEMENTS

on the C64 for £9.95 cassette and £12.95 disk.

Go for Golf is a budget sports simulation featuring six events. There is the 100m sprint, the long jump, 110m hurdles, archery, weightlifting and springboard diving. To score yourself mentally at end physically will cost a mere £2.99 cassette and £4.99 for the disk version.

Gold, Baseball and Basketball - championship style - are all now available from America's Gamestar software house courtesy of Activision UK. Prices start at £9.99.

Championship Golf takes you to the famous Pebble Beach course where you begin by surveying each hole from an overhead view. Full analogue screen views allow you to plot your shot Club selection, foot position and direction are all under your control as is the motion of your swing from start to finish. **Baseball** is comparable for the wind from the ocean.

Championship Baseball Three-Time allows you to compete in a team and divide yourself to the spirit of the game. The roar of the crowd, the smash of the bat, slam-dunks, three-point shots - all these features are included. You can also compete in a few divisions, 23 team league.

Championship Baseball has betting practice, match money values, statistics, pitching, outfield rallies, base running and sliding under tags. You become player and manager by selecting your team and competing yourself. After each game you can review the division standings to check your progress in the race for the pennant.

From the Far West to the Far East, **Acad** brings you **The Boxing** for the C64 (with an enhanced version for the C128 on disk). C64 cassette priced at £2.95 with the C64 disk version at £9.95. If you want to go one step further on your C128 then the disk is £11.95.

Another game in the physical violence genre is **Strike Area** from Maritech. **Baseball** was only the best. Maritech has taken on International Radio champion **Brain Jacks** an archaic concussion. **Brain Jack** "I am very pleased with the results I have seen so far. Not only is it a fun game to play, it can be used as an alternate training aid." A copy of the C64 version should now be awaiting you in your local computer games store.

Teacher DS Golf, Chris P.S., Bedford Way,



Wolton Birmingham B6 7AL Tel: 021 256 218 **Acad** 23 Road St. London NW3 2PN **Acad** 23 West Hill, Bedford Way B41 2PE, Tel: 0475

0173 Market, Market House, 40 Tavock Proctors Bay 2, Dorset BA14 6EE Tel: 0125 764456

Latest Hops

Verbatim is offering engraved design, packaging and testing to buyers of **Games** - a new top of the range mini-disk.

Verbatim's claims for the development and quality of the new **disettes** are high indeed. The disks are subjected to over 100 tests during manufacture and are thus certified 100% error free and carry a lifetime guarantee.

A specially formulated lubricant protects optimum retention and lubrication at temperatures as low as 5 degrees C and its jacket is made from a special PVC which allows operation without deformation at temperatures of over 70 degrees C. Suitable for Electronic and Amstrad disks.

Audio Technics is a company which also wants to make your disk headsets a little less severe. **Play** **Clones** cleans up floppy disk heads and so avoids disk errors.

Features of the product include **Safe** design containing no magnetic materials or compounds, safe, quick cleaner prevents disk errors, suitable for single and double sided drives, cleaner is dry requiring no liquid, ap-

plies in the volume for ordinary disks, can be used up to 150 times.

The 30" version costs £19.95

Verbatim, Philips and Reed Associates 26 Abam and The Abing High Street, Kingston, London W8 4LQ

Audio Technics, Technics House Lockwood Close, Leich 2, S11 3JG, Tel: 0117 777461



DATA STATEMENTS

Cartoon Time

Amusement has signed up two major Hanna-Barbara cartoon series and is producing them as computer games.

Both cartoons will be recognizable to viewers of children's TV.

The *Cosmozoids* are a supreme sort of three men made all powerful by Easidomes as to which they attack advanced assault weapons. Each *Cosmozoid* has gained the power of 1000 men and becomes both man and machine - the embodiment of Power-cosmos.

In *The Challenge of the Galileo*, renegade lasers on the planet Clobotus have been forced to flee. They are led by the ruthless Cy-Kill, the noble Captain, the cold Moxed Clay Tar and the Quabods of Clobots, Zed.

They are matched in strength by The Guardians, led by the good Leader I, the courageous Tarfo, the computer ace Scooter and three human allies Matt, Nick and AJ.

Both games are released on the Hudson label from Amusement for the CM and C128.

Executive

Amusement: 69 Long Ave. Cause Garden, London WC2N 5NF Tel: 01 634 9417



Rya Holloway - second order

In the Saddle

According to the *Market of the Sportsman* joystick, the demand for their product has been so great since its launch in January this year, that they have been hard pressed to meet it. In fact Kamek claims that demand has outstripped supply three times over.

The situation has now changed (not just) with Kamek fairly drowning under a waterfall of joystick orders off the production lines at the factory in Tredgarr. While Sael you have had a yearning for a new Sporting joystick for the last twelve months and met with bitter regrets and disappointment at every retailer in obtain the coveted possession that you can now breathe a sigh of relief.

Rya Holloway of Kamek now (as he is) comes out of a cardboard box. "We would like to thank all our customers for their patience over the last few months. Now that the joystick can be produced in sufficient numbers we are concentrating on ensuring the best pro-

duct you will also the best-selling joystick yet." The price is £12.95.

Chetuk Marketing also believes that it has the ultimate joystick with the *Mark 1 Joysticks of the Mark 1* which Chetuk hopes will justify the claim and four five buttons, two on the base and two on the handle, to ensure that both left and right handed players can use it comfortably, fast response-time, instant rapid action slider switch for auxiliary, fast gripping carbon pads on the base. It's built from high impact, wear resistant material with top quality micro-switches and a high grade metal shell. The cost? £14.95.

Funding

Amuse: Unit 12-14, Sackville Way
Industrial Estate, Tredgarr, Gwent
NP23 4QQ
Chetuk: J. Widdowson, Sower Park,
Cruckton Road, St Mellons, Cardiff
Tel: 0222 777167

Mark 1 from Chetuk

DATA STATEMENTS

Word and Wonderful

Palace Software, makers of the classic *Condores* games, have now announced the release of *The Sacred Armour of Antares* on the C64.

Antares is a visually stunning arcade adventure. And Palace's faithful programmers have put in months of work to perfect the amazing graphics and sound.

Written and designed by comic artist Dan Melzer, the surreal track, and special effects were created by Richard Joseph and *Antares* was programmed by Brian K. Lewis. Included with the game is a 16 page illustrated booklet, also by Dan Melzer, which explains the legend of the Sacred Armour and the background to the game.

Antares will initially be available as C64 cassette at £9.99 and a disk version is forthcoming (though a date has not been fixed).



Dan Melzer - *Antares*'s artist

features of investigating the queen Orlan drinks an elixir which sets off a chain of events to keep the desert out of the country and with a general election looming the king is becoming pretty worried. Here you arrive to witness peace, prosperity and stability to the deprived peasants. Or do you? First you must discover your goal and then find the best way to achieve it.

Features of *The First* include a sophisticated language parser allowing complex sentences and extensive vocabulary, 30 atmospheric directions, a graphics window allowing the

player to scroll graphics up and down the screen, over 1000 word processing style text editors, representation of all characters of their class in a real world setting, complex information about their attributes and properties linked to their particular position or context in the game.

Enquiries

Palace Software, 171 Finchley Road, London N1 3AF Tel: 01 279 8751 (London), 24 New Oxford Street, London WC1A 1PS Tel: 01 240 6666



New from Rainbow Software (developed by Microsoft Sweden) is *The First*. An adventure set in the magical world of Korvona. There are separate versions for the C64 and C128 both consisting of two disks and retailing at £19.95.

King Erik, ruler of Korvona, is going through a bad time, what with famine and bankruptcy. The peasants are beginning to feel his neglect and are thinking of revolting themselves. Part of Erik's bad luck is due to the fact that the Rookinyyoth dwarfs, makers of the best whisky in Korvona, were all banished under

Into the Underworld

CRG has brought us another game from the St Brink's Classroom, this one's called *Deep Mission* and features a pig's blue rabbit who lives in 1832 Chicago and wants to take over from Al Capone to become Public Enemy No 1.

This game is for those who like violence, theft, bribery and corruption with a lot of tongue-in-cheek humour thrown in.

It's now available for C64/C128 at £7.99 cassette and £12.95 disk.

Amusement is also getting into the world of crime with the new release *They Walk a Million*. You're the boss of a small game gang, pull out of jail, so of course you're short of money.

Using total blueprint you choose your target and then all you need is a gang. There are five targets to choose from ranging from a High Street jeweller to a bank, by then used and there are 18 criminal characters to help you succeed plus five bosses to get rid of the wall and turn it into the money money that you want. C64 cassette is £9.99 and the disk is £14.95.

Enquiries

CRG, CRG House 4 Kings Road, Copenhagen, London E13 3ED Tel: 01 741 2075. Amusement, 688 Long Ace Court, Garden, London WC2E 9JH Tel: 01 833 3471

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the horrible fate of the notorious alien planet being produced on planet Erebus.

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D A T A S T A T E M E N T S

Indoor Games

Sports simulations may be popular but so are computer versions of games which are strictly for those who don't like being out in the cold. Here's a batch of the latest.

Ray Brite's latest release is *Miami Star* (traffic jam boys!) which is a Crayn game simulation - American style. You can choose the players from eight different characters, rename them, place bets and then roll the dice. There's a table score facility and animated players who will even comment on the game. *Miami Star* was launched by Ray Brite using a real computer joystick and specially suited games could have a shot at missing a Ray Brite T-shirt or even a pair of underpants. Like all games in the Ray Brite range, *Miami*

Star is £2.99. A C64 screen is available.

Allgate's latest release is *Pub Games* for the C64/128. It costs £3.95 on cassette and the disk version is the same price.

Seven games are included in both formats. These are all traditional pastimes to be found in the smoke-filled, heavy atmosphere of a pubhouse around the country. There is table football, dominoes, pool, poolroom, skittles, bar billiards and of course darts.

Football

Ray Brite Victory Means Leicester Place (London WC2) £6.95. Tel: 01 479 0665. Allgate 1 George Street, Sheffield S1 4JH. Tel: 0342 713396.



Free trials of APC with a software system.

The MSP 100 is an 80 column printer while the MSP 120 prints across 132 columns apart from that both machines have identical performance characteristics. Draft output is 180 characters per second and MLQ speed is 40 characters per second. Other features include standard UK baller, full set usage graphics, proportional spacing and both is IBM and Epson compatibility. The MSP 100 sells for £149 and the MSP 120 is £149.

Fuzible

Citizen Europe, Wellington House, 4-18 Cowley Road, Oxford, OX4 1JF. Tel: 0189 22627.

Citizen's MSP 100 and 120



Model Citizens

Three new printers are being added to Citizen Europe's extensive range. The models are the HQP 43, the MSP 100 and the MSP 120.

The HQP 43 has a 36 pin (13 x 13 staggered) printer with three of resolutions, print speeds of 360 CPS in draft mode, 132 CPS in correspondence mode, and 60 CPS in letter quality mode. It has built in push lock, 82212C serial interface on standard paper out sensors a 24K buffer and a variable proportional plus continuous other specifications. The HQP is now available.

YOU'S
COMMODORE

As you will now have realised, if you are one of our regular readers, your Commodore is a magazine which does not stand still. We are always working to make the magazine a more enjoyable read both in content and looks.

In accordance with this, to celebrate the new year, our January issue will have a bright distinctive new logo,

to keep your eyes peeled for this.

The January 1987 issue will also appear one week early on the shelves of your newsagent so rush out and get it on the 28 November.

The February issue will be published on the usual date, that is the first Friday in January 1987.

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*The name
of the game*

GAME OF THE MONTH

Druid

Enter the dark, dark depths of Firebird's latest masterpiece and see if you can survive

By Stuart Cooke

The arcade game market has certainly started off a new phase in computer games. More computers are producing clones or programs similar to the popular arcade game. Firebird is offering us *Druid*. It has everything you would expect: spells, attacking dragons, treasure and obviously an overall goal. What's more it is surprisingly easy to play. *Druid* is a simple yet sophisticated and beautiful. It's not as if you're going to talk your opponent a while to win.

The object of the game is to guide your druid through numerous levels of dungeons and find your old skills that were granted by the Powers of Darkness. At the start of the game our Druid finds himself surrounded a force with a number of spells to protect him. No matter how he started on his quest, that the enemy lets his goats and goats at you. Be thankful that your druid is carrying a number of water spells as a quick blast from one of them is enough to banish the monster back to whatever plane of your CD's memory they came from.

The water spell isn't the only one that you discover as you fly. It's always to fire your elements, spells, attack that

different monster that he made upon his travels. Different spells having more effect on some than on others. A key spell enables him to open a key door that he comes across, if he should want to. Inevitably spells allow your druid to disappear for a short time. Chaos destroys everything in



right and perhaps the most interesting of all spells, the Coloss spell gives your druid an aid by his side.

You can replenish your supply of spells by searching the treasure chests that you find as you play. It's worth however, to make sure that you choose the right item from the treasure; once the rest will disappear as soon as one item is retrieved.

The Chaos and Immobility spells are quite easy to understand; the Coloss however needs further explanation. The Coloss when brought into life will wander around the playing area either under the control of yourself or that of a second player, with a second joystick. The Coloss has no interest in its own safety and kills everything that it comes into contact with, even if that does mean that his energy is reduced and he will finally disappear into nothing. If you are using the Druid control the Coloss then it does take quite a bit of handling. Getting the Coloss to go where you want it to is sometimes quite an impossible. Quite often he'll simply get in your way so that you can't move anywhere. When another player takes control the game becomes much easier. With the Coloss taking care of the monsters the Druid has much more time available to him to find treasure chests and the new deeper into the complex, and hopefully to the last skills.

Energy is something that not only the Coloss loses upon contact with the monsters, but the Druid also suffers from this type of loss. As with most monsters, the druid does only have one life. He can however replenish his energy by standing upon one of the magical pedestals that are to be found

while playing after the skills.

The graphics used within the game are in the main excellent, with only a few of the monsters lacking in reality. There's nothing worse than watching a quarrying goblin heading towards you when you've just run out of spells. The monsters lack any real intelligence and seem to take the shortest path to you. This means that a really well-placed fireball will knock behind some object, be it a wall of some thing, allowing the druid to pick it off in his leisure.

The actual playing area consists of a number of large scrolling levels. The scrolling of the background being very smooth. As with all life the fact that you don't see the whole screen is annoying when you find you're just bottled you very fast a horde of gnomes only to find yourself in a dead end and having to retreat your steps.

Druid is an excellent game. It is extremely simple to play with minimal controls, the joystick is used for movement with just a few keys to cast spells, and is extremely difficult to master.

The numerous levels of the game are worth to try both the newcomer to computer games, and the arcade freak hooked for quite some time.

FOURSCORE Ltd. *Druid Price £7.95 Machine C64 Supplier: Jurdell, Widdowson House, Copper St Moor's Lane, London WC1R 7JZ. Tel: 01 474 9799*

Citymaster 32M *Priceability 20/10 Graphics 10/10 Value 20/10*

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Win A Citizen Printer

Citizen has teamed up with your Commodore to offer a very special prize to celebrate this Christmas issue

One of the most important pieces of hardware that any Commodore owner could have is a printer. Should you not have one, programs (BASIC) are created that you have printed that you can produce. Imagine of your work to be. You can throw away your old hand's and start to produce professional looking letters to send to your friends, or more likely your bank manager. All in all you shouldn't be without one.



However there is one small problem, a good printer is so expensive.

Well now, for one person at least your problems may be over.

Citizen is offering as a prize for this month's spot the difference competition, an excellent 130D dot matrix printer. Priced at £197 + VAT this printer offers all of the following features:

Expanded, compressed and double strike print

Italian, overprints and subscripts

Correspondence quality print for producing high quality protocols

International characters for 11 countries

Programmable graphics

16 pages 128 characters per second

It will behave as either an Epson compatible printer or an IBM graphics printer.

Easy to access switches for selecting different modes.

Please see more.

As you can see the 130D is a very special printer whatever class it will certainly find a market.

To show the printer will work straight away with your Commodore we require a Commodore printer interface to also being included so that you will be able to use the printer with your Commodore software.

How to Enter

Study the pictures on this page. There are several differences between the two.

Mark the differences on the picture which is attached to the entry coupon that completes the rest of the coupon and send it to us. Make sure that you write clearly. Write the number of differences you found on the back of the envelope.

Citizen Competition Entry

Closing date: Monday, December 28, 1985



Entries will not be accepted from Send your entry to: Citizen employees of Argus Specialist Competition, Your Commodore 1 Publications and Citizen The Golden Square, London W1R 3AB. restriction also applies to employees' families and agents of the company.

The How to Enter section forms. Write clearly and fully and don't forget part of the rules. The editor's decision to write the number of differences you find and no correspondence will be have found on the back of your envelope.

Name
Address

Postcode
Number of differences found

Wigmore Offer

Your Commodore together with Wigmore House present
a host of special offers on their mouse and related
material

The Christmas Commodore is glowing, among other items, a mouse and graphics software on cassette. We received this mouse in the March '88 issue of Your Commodore and were very impressed with it.

Wigmore, the company which markets the mouse, has recently released a new package called *Animal 64* to which we gave a glowing review in the November 1986 issue of the magazine.

Because we were so impressed by the mouse and its associated software we have teamed up with Wigmore House to provide our readers with a series of special offers based around these products.

1) Firstly we have the mouse itself. As previously mentioned Commodore was so impressed with this package that it has been bundled into the Christmas Commodore's collection package. The software (there is support on cassette and a revolutionary introductory graphics package) The mouse is well constructed and has a track which enables it to emulate a joystick.

The retail price for this package is £44.99. We are able to make it available to you for just £42.99 plus £1.99 p&p.

2) As mentioned above the graphics package that comes with the mouse is a tape only version. Wigmore has made a disk available and we are also offering a special offer on this. This may also be of interest to purchasers of Commodore's Christmas pack who would want their mouse to work with disk. Price, just £7.99 plus 75p p&p compared to a normal price of £8.50 plus p&p. The disk software loads at 5-6 times normal disk speed.

3) *Animal 64* is an excellent graphics package and we were extremely impressed with our usage of capabilities. It is in fact probably the most versatile graphics program that we have seen. You don't need a mouse to use it as the software will quite happily work with joystick.



Price, just £29.50 plus 75p p&p
Usual price £34.99

4) Disk *64p* takes the mouse even further. It gives you £64 for £18 in *64d* model a range of interesting options which are accessed by the mouse.

The package includes each format as a 100 year calendar, a diary, a clock, calculator, disk software and much more. Price £13.50 plus 75p p&p for cassette and disk.

78

Wigmore Order Form

I would like to order the following Wigmore products

PRODUCT	PRICE	CODE	QUANTITY	TOTAL
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**WARGAMERS
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Club 128

A look at what is available on CompuNet this month together with details of a very special free offer

By Neil Day

I've been reflecting recently on that great engine, the John Bull Rolled Over packet. It carried a large picture of John Bull, with top hat and Union Jack vest, proudly carrying a packet of John Bull Rolled Over. If you looked carefully you could see that the illustrated packet had its own packet of John Bull smaller but equally explosive, and he was definitely carrying a further, microscopic, packet of rolled oats. Many a breakfast was absentmindedly consumed by people asking the ancient, but fundamental, question of how many awakens eating John Bulls could be seen assuming, as economists say, perfect information and better printing than is usual by found on the average porridge packet. How many of the future might exist on something like this to replace the capacity of twentieth century man to deal with increasingly strained computer languages?

It was the intention of items to mention in this month's issues of Club 128 that set me thinking about John Bull and the porridge packet. A lot of the very best things available on CompuNet simply help you use the network more efficiently. Once you are made better use of it, you introduce more programs and information that enable you to use CompuNet even more effectively, and so on. I'm not sure if the cycle of exploring and learning about the network would

avoid the number of John Bulls an enthusiastic porridge eater could devour but it is a lot less boring!

Enhancer

One of the most popular programs available on CompuNet is the Editor Enhancer uploaded by MACHO. For readers who aren't familiar with it, Editor Enhancer adds graphics capabilities to the CompuNet Editor program that comes built in to the modern use purchase. It enables you

to edit at the asking price, more than reasonable compared with the cost of similar commercial graphics software.

Utilities

The CNET UTILITIES area (GOTO 245) includes many other programs that make life easier for CompuNetters. Most of them have a very professional feel about them. For sheer excellence of design and quality of documentation no one would be hard-



to edit spectacular graphics effects to CompuNet frames, and can be used with different character fonts to produce a range of large "typofaces". Frames users have designed their own fonts, and, except of course, there are fonts available for other users to download. There are more than a dozen fonts to choose from!

If you're new to CompuNet, you'll find a number of frames about the behavior of your GOTO ENHANC

program to find a program superior to Simon Driver by ARY (GOTO 10212). If you have it, Space compatible printer. This program is an essential purchase as it lets you print text or graphics from CompuNet frames. The impressive thing about the program is its flexibility: when printing text the user can set up the page length and the horizontal position where the frame will be printed. For changing graphics there is a wide range of choice. For





allows the translation of each of the 16 screens can be set by the user one of three preset times.

The program costs £2.95, more than available given its usefulness and quality.

Icons

There are many other programs of interest in the various applications area. For example a ARMINIX updated by AMIG has recently been updated. This provides an icon driver disk operating system as well as other features. It costs a mere £1.99 (DITO & CDROMS).

These programs show the advantages of having user software on Compaq. You can read the documentation in your lexicon before purchase. These are detailed reviews available in the directory alongside the program or you can DITO SERVICES for a full set. It is easy to contact the programmer or the company with queries. And, if my experience in anything to go by, the authors are only too keen to discuss the use of their programs and consider modifications or improvements. It's that with commercially purchased software! Finally, you can hear the opinion from a range of other users. For reviews, some comments, or purchasers have been updated over the DRIVER program covering the use of the interface with a range of printers.

Free Modem

Compaq is making a very attractive offer to non-members. For £15 plus £7.50 postage you can get a free

modem with their monthly subscription to Compaq's Gold series. This provides, if anything, more facilities than the home user is likely to need. The most realistic is to remain a member of Compaq for at least a year but that should be no problem! Get in touch with any Compaq user. The members that Compaq is offering show who aren't new members should ensure a warm welcome!

If you can't find the prices mentioned in this article it's possible that they have died. If possible I'll try to recontact them and leave a note of any changes in the POLICE directory (DITO SERVICE) or the MAGAZINE SCENE directory (DITO MAGS).

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Wimp

Create an easy to use icon environment in your own programs with the first routine in a new series.

By Allen Webb

This is the first part of a series of routines for the slightly more serious user. Over the months, I intend to describe some routines which will simplify the writing of Basic programs. The majority of routines will be in machine code that allowing you to perform complex sequences by the use of a simple SYS call.

The first package is somewhat larger than most and provides three variants of a WIMP environment. For those of you who don't know, WIMP means Windows, Icons, Mouse and Pointers. This package mostly covers the WIMP part since Windows would need quite a bit more code.

Many machines use the WIMP system to provide a simple "front end" whereby a user with little training can use the software. Icons (little pictures) are used to represent functions, these being selected with pointers controlled by a mouse. Due to the constraints of such a system, bit mapping of the screen is mandatory. Hence the rather large lump of code.

The code is in two Basic loaders (using 1 part 1 and 2). Below I describe how you use the routines, if a list of 1 indicates the memory usage.

Command Figure 1

Figure 1	
8100-8000B	Work space
8080-8074F	Text buffer
8080-8080B	Pointer Space
8080-8081FF	Colour menu
8080-808FF	Colour buffer
8080-809FB	Icon library
8070-807FF	Spine RAM
8A00-8B0FF	Bit map
8700-8A4EB	Machine code
8C00-8C1FF	Character set
8000-807FF	Bit map buffer

This shows the memory areas used by the package. When using the package you are left with about 10K which should be enough for most purposes.

The package provides 20 commands. They are defined via a jump table starting at 8C000(4B15D). I shall refer to this address as SA from now on.

SETUP (SYS SA, INK, PAPER, BORDER)

This routine switches on the bit mapped screen and sets the ink, paper and border colours as required. Ink refers to the colour of set points, and paper refers to the colour of unset points. I have defaulted high resolution mode with 320 by 200 points and two colours. This gives the most satisfying results. This routine cleans the bit map.

COLSET (SYS SA+3, INK, PAPER)

This instruction sets the bit map to the specified colours without cleaning the area.

TURNON (SYS SA+6)

This command simply turns on the bit map whilst leaving the pointers and colour unchanged.

TEXT (SYS SA+9)

This allows you to return to the normal text screen.

POINT (SYS SA+12, X, Y, FLAG)

This is the first instruction involved with the changing of the screen colours. The command acts on the point X,Y according to the value of the flag.

Flag = 0 error point
Flag = 1 set point
Flag = 2 flip points

The routine checks the X and Y values. Values greater than the current scope are set to the maximum values of the screen.

CHANGCOL (SYS SA+15, INK, PAPER)

You may, from time to time, want to change the colours in a particular area. This command does this but leaves the rest of the screen unchanged.

ZONE (SYS SA+18, XS, YS, XF, YF, FLAG)

This command is closely related to POINT in that it is used to change a rectangle of screen according to the FLAG (see command point for the values). The rectangle is defined by its top left corner (XS, YS) and its bottom right corner (XF, YF). The command sets to single pixel resolution and is therefore a little slow.

CHARS (SYS SA+21, ADDRESS)

This allows to print text on the screen in a crucial part of this package. The design of the characters used are kept in a block of RAM from 8C000 to 8C00F. This provides enough space for 256 characters. You can of course load your own designs to this area. Alternatively, you can copy the 4th character set down using the instruction. The relevant addresses are:

Upper case 81244
Lower case 81266

TOGGLE (SYS SA+24)

The screen used location 1000 to decide whether the colour matrix is to

be updated each time a point is re-manipulated. This instruction handles the location. This allows you to alter the design without messing up the outline. It is nice to POKE 1601 with one at the start of your programs to enable colour updating.

BASICSCREEN (SYS SA+27)

This routine sets up a standard screen design. This has the form of a sheet of paper with a standard heading zone and a "previous page" zone. The default colours are set to two grey shades.

HLINE (SYS SA+30, XS, YS, XF, FLAG)

This draws a horizontal line from XS to XF at YS according to the value of the FLAG (see PLOT).

VLINE (SYS SA+32, XS, YS, YF, FLAG)

This is the vertical analogue to HLINE.

SHAPE (SYS SA+M, ADDRESS, X, Y, WIDTH, HEIGHT, FLAG, RP)

The most vital aspect of this system is the use of shape tables to generate icons. This command draws a shape stored in RAM starting at the specified address. The top left corner of the drawn shape is placed at X,Y and the shape occupies a square of characters of specified width and height. The flags have the following effects:

FLAG

0 overlay (area) current screen contents
1 OR shape with screen
2 AND shape with screen
3 XOR shape with screen

RP

0 draw normal shape
1 draw shape in reversed field

The shape is stored in the same way as the character table. Consider a design of characters, 3 by 2 in size:

The character A is defined by eight bytes, as is B etc. These must be stored in sequence in RAM, i.e.

ASCDEF

If you're not sure about defining characters, take a look at the 64 Programmer's Reference Guide.

PTEXT (SYS SA+38, TEXT, LINE, TAB, FLAG, RP)

This command prints a list of text on a specified line starting at a specified horizontal offset (TAB). The effects of FLAG and RP are as in SHAPE.

Text can be input as a string or in quotes, the following examples being valid:

```
SYS SA+38,AE3,5AB
SYS SA+8,"HELLO",0,1,1
SYS SA+8,"FILE "+$10+"
SCRATCHED",0,0,0
```

ZSHAPE (SYS SA+42, X, Y, WIDTH, HEIGHT, ZP)

This instruction sets up an area of whole characters of specified height and width with its top left corner at X,Y. ZP has the values:

```
ZP=1 ..... draw area  
ZP=2 ..... reverse field area
```

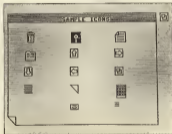
This instruction is useful for highlighting areas and providing non-destructive cursors.

ICON (SYS SA+45, ICON, NUMBER, X, Y, FLAG, RP)

I felt that it would be handy to provide a standard library of icons. I have therefore provided 13 of the most commonly used. The specified icon is placed with its top left corner at X,Y in accordance with the flags (see SHAPE). The icons provided are:

```
0 ..... Desk bin  
1 ..... Floppy disk  
2 ..... Sheet of paper  
3 ..... File index card  
4 ..... Arrow pointing up  
5 ..... Arrow pointing right  
6 ..... Arrow pointing down  
7 ..... Arrow pointing left  
8 ..... Punctured page  
9 ..... Hatched heading area (flag)  
10 ..... Bottom hatched area corner  
11 ..... Calculator  
12 ..... Cursor  
13 ..... Hatched heading area (area)
```

Icons 0,1,2,3 and 11 are 3 characters wide by 3 characters high. Icon 13 occupies one corner. The remainder are 2 by 2 in size.



ABC
DEF

STOWIT (SYS SA+4B)

This instruction copies the current screen (both bit graphics and colors) to two storage buffers. This allows you to keep a default display on hand for use with the "last page" screen.

GETIT (SYS SA+51)

This is the complement of STOWIT in that it recalls any screen currently in the storage buffers.

PRINTMENU (SYS SA+54, TEXT, LINE, TAB, WIDTH, FLAG, RF, INK, PAPER)

The core of WIMP systems is the scroll pull-down menus. These comprise of lists of options in the form of a list, from which you also make selections. The options took the most thought over I want it to have maximum flexibility. The text given in the command is printed as a line of specified width with its top left corner at the specified line and tab position. FLAG and RF have their usual effects and you may set the colors as required to give appropriate contrast from the background.

You should ensure that the text length is an exact multiple of the menu width. If you don't, the command won't crash but your menu may not look quite right. In addition, you must insert all options. Consider this simple menu and imagine that all entries represent spaces.

```
***DISK*MENU**
CATALOGUE***
VALIDATE****
SCRATCH*FILE*
```

The text used in the command will be:

```
***DISK**CATALOGUE***
VALIDATE****SCRATCH*FILE
**
```

A width of 13 should be used

POINTER (SYS SA+57, COL1, COL2)

This command establishes the pointer. This has the form of an arrow pointing downwards. To give a feeling of depth, the pointer has one colour

(COL1) and a shadow (COL2). The command has the action:

- 1) Turns on the pointer sprite
- 2) Puts the pointer at the top left corner of the screen
- 3) Turns on the shadow to drive the pointer

The pointer is controlled by joystick at post 1. Since the pointer is interrupt driven, it is moved independently of any basic program. You can, however, monitor the pointer's progress from basic by PEEKing these locations:

```
356 holds the number of the line pointed to
370 holds the number of the column pointed to
368 . . . . . holds the two button states (0=pasued, 1=not pressed)
```

KILL (SYS SA+60)

This disables the pointer. This command is required on occasions such as when accessing disks.

Examples

Well that's all of them. The important point to appreciate is that the package is deliberately general so that it can be used for the widest possible range of applications. You will have to write the BASIC kernel program. So that you have an idea of how to use the program I've included a simple demonstration in listing 1. This program is by no means optimum and is simply there to show you how the system works and to give a few ideas (so no complaints about the poor structure).

The program is a simple disk aid. The basic screen shows a simple four option menu. This is selected by the joystick with the option currently pointed to highlighted. The last page seen is the top right corner size functions. To choose an option, point at the required option and press fire. You will notice that neither screen nor menu light up until the pointer is on the relevant menu that feature is crucial.

Try using the program, apart from giving Y or N at one stage, you need not get the joystick.

The most important part of the routine occupies lines 130 to 390. In summary, the lines have the following effect:

- 110 Set up menu lists
- 115 Scan five buttons and see if pointer is listing an option or none
- 120 Read current line and column
- 130 Check whether pointer is off the menu. If not go to 140
- 140 On items, if currently pointing to an option, go back to 115
- 150 Pointing to new option so reverse field list option
- 160 Highlight new option and return to 115
- 170 Back to 115
- 180 Are we pointing to the menu, if so go to 210
- 185 If not and we were looking at the menu then do highlight menu and back to 115
- 190 Back to 115
- 200 Reset icon.
- 210 Highlight icon and back to 115
- 300 This performs the "last page" function

I've used the flags FL and RF to keep track of whether an option is highlighted or not. Additionally RF holds the position on the screen of the option on a menu. Since we know the position of the top of the menu we can easily calculate the number of the option (line 1890 shows that).

The screen option also uses a copy of the routine but uses a menu based on the array P18 which is coded by the catalogue tablemaker.

The only option which isn't covered by the package is the option of size from the keyboard. This need should not arise too often but if it should, try using 3 or something similar.

Given the time, I will write a more structured program which will really show what the package will do.

Your turn

I firstly want to activate your fountain pen. If any of you have any ideas or any problems that you would like covering in the drivable Responder column, drop me a line care of the editor at Four Caswellwood and I'll do my best to oblige.

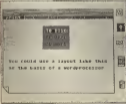
Should you create any programs using these routines that you think may be of interest to other Four Caswellwood readers, please send them into the magazine and we will publish the best ones.

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PROGRAM LISTING PART 1

These are MEMORY addresses
including map pointers

01	00	00000000	00000000	00000000
02	00	00000001	00000001	00000001
03	00	00000002	00000002	00000002
04	00	00000003	00000003	00000003
05	00	00000004	00000004	00000004
06	00	00000005	00000005	00000005
07	00	00000006	00000006	00000006
08	00	00000007	00000007	00000007
09	00	00000008	00000008	00000008
10	00	00000009	00000009	00000009
11	00	0000000A	0000000A	0000000A
12	00	0000000B	0000000B	0000000B
13	00	0000000C	0000000C	0000000C
14	00	0000000D	0000000D	0000000D
15	00	0000000E	0000000E	0000000E
16	00	0000000F	0000000F	0000000F
17	00	00000010	00000010	00000010
18	00	00000011	00000011	00000011
19	00	00000012	00000012	00000012
20	00	00000013	00000013	00000013
21	00	00000014	00000014	00000014
22	00	00000015	00000015	00000015
23	00	00000016	00000016	00000016
24	00	00000017	00000017	00000017
25	00	00000018	00000018	00000018
26	00	00000019	00000019	00000019
27	00	0000001A	0000001A	0000001A
28	00	0000001B	0000001B	0000001B
29	00	0000001C	0000001C	0000001C
30	00	0000001D	0000001D	0000001D
31	00	0000001E	0000001E	0000001E
32	00	0000001F	0000001F	0000001F
33	00	00000020	00000020	00000020
34	00	00000021	00000021	00000021
35	00	00000022	00000022	00000022
36	00	00000023	00000023	00000023
37	00	00000024	00000024	00000024
38	00	00000025	00000025	00000025
39	00	00000026	00000026	00000026
40	00	00000027	00000027	00000027
41	00	00000028	00000028	00000028
42	00	00000029	00000029	00000029
43	00	0000002A	0000002A	0000002A
44	00	0000002B	0000002B	0000002B
45	00	0000002C	0000002C	0000002C
46	00	0000002D	0000002D	0000002D
47	00	0000002E	0000002E	0000002E
48	00	0000002F	0000002F	0000002F
49	00	00000030	00000030	00000030
50	00	00000031	00000031	00000031
51	00	00000032	00000032	00000032
52	00	00000033	00000033	00000033
53	00	00000034	00000034	00000034
54	00	00000035	00000035	00000035
55	00	00000036	00000036	00000036
56	00	00000037	00000037	00000037
57	00	00000038	00000038	00000038
58	00	00000039	00000039	00000039
59	00	0000003A	0000003A	0000003A
60	00	0000003B	0000003B	0000003B
61	00	0000003C	0000003C	0000003C
62	00	0000003D	0000003D	0000003D
63	00	0000003E	0000003E	0000003E
64	00	0000003F	0000003F	0000003F
65	00	00000040	00000040	00000040
66	00	00000041	00000041	00000041
67	00	00000042	00000042	00000042
68	00	00000043	00000043	00000043
69	00	00000044	00000044	00000044
70	00	00000045	00000045	00000045
71	00	00000046	00000046	00000046
72	00	00000047	00000047	00000047
73	00	00000048	00000048	00000048
74	00	00000049	00000049	00000049
75	00	0000004A	0000004A	0000004A
76	00	0000004B	0000004B	0000004B
77	00	0000004C	0000004C	0000004C
78	00	0000004D	0000004D	0000004D
79	00	0000004E	0000004E	0000004E
80	00	0000004F	0000004F	0000004F
81	00	00000050	00000050	00000050
82	00	00000051	00000051	00000051
83	00	00000052	00000052	00000052
84	00	00000053	00000053	00000053
85	00	00000054	00000054	00000054
86	00	00000055	00000055	00000055
87	00	00000056	00000056	00000056
88	00	00000057	00000057	00000057
89	00	00000058	00000058	00000058
90	00	00000059	00000059	00000059
91	00	0000005A	0000005A	0000005A
92	00	0000005B	0000005B	0000005B
93	00	0000005C	0000005C	0000005C
94	00	0000005D	0000005D	0000005D
95	00	0000005E	0000005E	0000005E
96	00	0000005F	0000005F	0000005F
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100	00	00000063	00000063	00000063



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Now Even Patter

Show Stoppers

For those who didn't manage to get along to the Commodore Show in Manchester, our show report brings you the highlights.

By Allen and Margaret Webb

It was with much anticipation that we took ourselves 20 miles down the motorway to the great metropolis of Manchester to see this year's Commodore Show.

For whatever reason, it was decided that an alternative venue to London was to be used this year. In all, it was a mistake.

Compared to previous shows, this was a rather small and unexciting affair. Having said that, we have nothing but praise for those companies that did choose to attend, for the rest, we simply despair.

The choice of a date to close to the PCW show was probably the main error, but the deliberate choice of the major software houses to only attend the London show sealed the fate of this event. We know that times are tough for the industry but by appearing the Commodore Show, the industry is simply being the head of those that led it, i.e. Commodore owners and users. It was also particularly hard on those of us who live in the north and who cannot afford the price of attending the shows held in London.

OK, having got that grip out of the way, here's a random list of the highlights of the show.

Overall there were about 20 stands,

the centre-piece probably being Commodore's.

The New Boys

The 64C was very much in evidence, as was the Amiga. This was our first close encounter with the Amiga and we were thoroughly impressed. We had a long chat with David Hill of Commodore who alluded to all sorts of amazing plans without giving any details. There certainly appears to be some special 64C package for Christmas, the only question is will it make the machine attractive enough to sell? Was someone asked that it won't?

Sadly, there was no indication as to what action was to be taken to make the Amiga more accessible to the home user.

It's a Gas

While on the subject of the Amiga, Stephen had an Amiga running a transporter via a robot. For those of you who haven't met it, the robot converts the Amiga into an IBMulator. Since they hadn't got the necessary graphics driver, it wasn't possible to have a flashy demo.

Instead, the transporter was quietly calculating the diffusion of a gas in a stagnant room. Not guaranteed to get everyone twisting but impressive enough.

School Days

The greatest source of noise at the place was the Colleen stand. The company has a number of interesting products most of which are aimed at the educational market. The area of music is well supported by a Music Compendium and a Music Creator. The compendium seems to be a complete teach yourself system and appeared to be quite comprehensive. The Music Creator allows you to write your own and then converts it into a piece of coverage driven code. This allows you to use the music in your own programs. The value of the music has been amplified by a Quality adventure called Mystery Forest. It was announced that a Future Quest system was well under a month to the main system. It will be interesting to see if the enterprising. A particularly interesting product from Colleen was a variant using Amiga's Voice Associated Data. This allows you to write music by

simply entering the names. Due to the nature of the show, the device was not demonstrated but there was a video showing a brilliant. It appears that the system, at least all Colburn's range is aimed at the disabled and as such will be a valuable and cheap aid. We managed to get hold of a preview copy of Colburn's forthcoming educational software. With the Educational column for our appraisal of it.

The Hard Stuff

Eritham Micros had the usual hardware products on show with a particular emphasis on Duplex 804. This hardware addition for your disk drive enables significant increases in I/O and SAVEing speeds. Since the overall performance of the disk is increased, and even file loads are handled more quickly. The result is quite phenomenal.

Another hardware specialist company which attended was Telogy. Telogy's flagship device is the Expert Calculator. This device uses software from disk rather than an ROM to give a flexible, easily updated, product. Apart from the existing feature frame and monitor functions, add-in and a variety assembly to demonstrate which gives variable source code) uses the popular A new product is the Eyegaze. This is a device which allows the use of either joystick port for a single stick. A switch on the top of the box allows you to switch the stick to either port or both. We've tried this unit out and it's certainly well made and works well. It's main value is that by eliminating the need to physically move your joystick from one port to the other, it prevents nerve accidents which might blow your interface chip. On the whole, a nice little number. For 12 owners, Telogy offers a genuine hard F-Disk which converts 81.88 to 80.00 so allowing you to get 80 columns on TV. Some not all TVs are suitable, you should talk to Telogy if you are interested.

Clabbing

For the real enthusiasts, there was the usual stand from ICPUG (Independent Commodore Products User Group). Using the normal channels and guide the Club managed to attract

our interest far from our ever hardened bank account. Seriously, though, at only £88, membership is a great investment.

All Systems Go

System Software had a number of very interesting items. This company specialises in compilers for various languages. The well known Fortran has been extended to the 128 and looks very promising. A new product is a book called *Macbook 128*. This is a collection of useful items and includes a RAM-disk facility. A 64 compilation comprising of Pascal and Basic compilers and a tutorial is also on the cards.

Analytically speaking

The supposed selling point of the 64C is a thing called GEOS. First Analytical Ltd, the UK agent for this product, was in attendance. GEOS, if you don't know, is a window/size system providing file handling, a text handler and a graphics pack. It seems quite a nice suite of programs. Spreadsheet and word processor software are scheduled for later this year making the system more attractive to the serious user. GEOS is an interesting albeit expensive package which is worthy of a close look for elsewhere in this issue for a detailed review.

More from Meridian

Meridian (Distribution) had an interesting mix of items. On the one hand, they had a range of hardware from the new defunct STACK Computers. On the other there was also a rather nice mouse driven graphics package called ARTIST. This software manipulates all most functions not experts from graphics reviews and gives interesting tracks.

On Line

The two main exponents of networking - Compucon and Muxcom - were in evidence with special subscription offers. These systems have improved a great deal and offer a wide range of facilities to those who are offered the phone bill (although they make the point that it's not that expensive!).

Repair Shop

A common source of enquiry is the problem of obtaining spare parts when your machine turns its back up. HRS Electronics Ltd, which claims to be the sole UK Distributor of CBM spares, was very much co-operative. Certainly, they may be a life saver for those obscure little ones.

Conclusion

So what was our overall impression? Well, the most appropriate word is disappointed. We got the feeling that this was a poorly organised show which made the 128 entrance the very steep. This impression of shabbiness was enhanced by the poorly produced Official Guide which was a joke to say the least. The use of a venue other than London is a good move but it must mean the same degree of support from the industry as the London-based shows - the world does not end at the Western Gap!

Timeline

Compucon Ltd 18 Bishop St, Penzance,
Hampshire GU14 6BQ
Tel: 0447 617000

Eritham Micros, Bridge St, Eritham,
Worce. WR11 4BT
Tel: 0456 61660

ICPUG, 26 Brunelton Rd, Newbury,
Berks. RG13 2AA
Tel: 0438 72229

Meridian (Distribution) Ltd, 20
Faversham Way, Medchester, Middlesbrough
TS6 4BE
Tel: 051 321 2202

System User 3C, Newcastle High
Technology Centre, Stephenson Lane,
Mars WGS 7TQ
Tel: 0487 803347

Telogy, 28 Alder Lane, Boreham & DM
0Q4
Tel: 0778 664289

HRS Electronics Ltd, Electron House,
20 Serr St, BS9 4BS
Tel: 031 771 2523

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Disk Drive 2000

Fed up of your 1541 disk drive, Firstline Software has brought out an alternative drive for the C64.

By Mycroft Appleby

With the desirable unavailability of the 1541 disk drive, and the unreasonable expense of the 1550/1 drive. What alternative for Commodore owners is there except to sell the car? Perhaps the Enhancer 2000 could help you avoid the necessity of such drastic action.

The Enhancer 2000 is a third party (i.e. you didn't make it, neither did Commodore) replacement for the official Commodore 1541 disk drive, with which it is reasonably compatible. It certainly looks like what a 1541 should have looked like if the designer of it hadn't had a headache at the time. It is a nice, half-bright unit, and is the same pretty grey as the Commodore 64. The considerable size reduction has been achieved by putting the power supply outside (except in the usual way as that of the Commodore 64).

This is a very sensible idea and doesn't clutter up your desk with too many big boxes. The Enhancer 2000 has a top panel of sleek but (like the 1541) neat and simple.

The connectors around the back are the usual two Commodore and the point is: This is the same type of socket, but the plugs will not go into each other's sockets. Otherwise connecting up is the same as a normal drive.

As far as using the device is concerned, it is operationally identical to the 1541. All the commands are there, even some of the more advanced and lesser used ones in an attempt to improve the compatibility. The manual, however, is a bit disappointing.

If somebody had said that this was possible to produce a more manual than Commodore I would have had doubts but now I know that it's true. The Enhancer manual is useful. However, there are a number of Commodore disk drive books on the market and any one of them will suffice.

If all else sounds like money for you, then I'm sorry because I have saved the horror bits and left. The

Enhancer 2000 is not compatible with most commercial software. Anything with a firm European turbo or some of the more recent American turbos, will not work. Likewise a lot of the more flimsy European copy protection. The American protection are catching up (like Antivirus) but some of it will still run (like Ezyx).

With some software however, it is the case that the program will run, but you cannot make a copy of it.

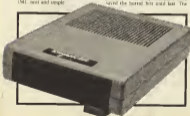
On the subject of turbos, it is probably worth mentioning that the Enhancer 2000 has its own built in, that increases speed by about 40%-50%. This does mean that when utilizing the turbo in the drive RAM will be required.

Conclusion

For £115, the Enhancer 2000 is a good buy. The speed at which the drive works is good, and the styling and reliability is as good as you can get. But incompatibility with a lot (up to 80%) of potential commercial software will be a very real consideration (you should also remember that the 1550/1 is also incompatible with a proportion of commercial software). On the other hand, if you are not going to be using that much commercial software then I would recommend the purchase without reservation. □

Touch Line

Product: Enhancer 2000 hard handled 5 1/4" Disk Floppy Disk Drive
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The screen picture shows the BBC Micro version of Repton 3.



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Welcome to the Machine

Get to grips with the C64's mathematical routines.

By Allen Webb

Well it's better for the last time since this year's final drive of machine code (do I have levels of despair?) is this issue. I want to thank off our computers with the 6510 by considering floating point routines.

In an earlier part I described how floating point values are stored on the bytes. The resident basic systems a wide range of routines which allow you

to manipulate these numbers. The question is why would you want to use floating point? If you want to write games, you don't need them — floating is too slow! If you want to write programs to manipulate data you WILL need them.

Table 1 summarises some of the floating point routines available.

FAC1 is floating point accumulator 1 and FAC2 is floating point accumulator 2. When the routine involves a floating point value in memory, the start address of the value is held in the register registers.

Another important function COMPARE FAC1 to a value held in memory. The address of the value is held in YACC and the entry point is BRCSB. The accumulator returns a value depending on the result of the comparison.

```
ACC = 0 FAC1 = memory
ACC = 1 FAC1 > memory
ACC = 0FF FAC1 < memory
```

LISTING 1 shows some example routines using two values in memory (N1 and N2).

Lines 40 to 50 show how to load FAC1 with a value. Lines 60 to 65 add two numbers. Lines 170 to 230 multiply two numbers. Lines 240 to 280 extract the square root of a number. Lines 300 to 350 simply print FAC1 on the screen to show that the routine functions correctly.

The ROMs also contain a number of handy constants which are readily accessible.

```
SIN(PI) ..... PI
SIN(2PI) ..... 2*PI
SIN(3PI) ..... 3*PI
SIN(4PI) ..... 4*PI
SIN(PI/2) ..... 0.5
SIN(PI/3) ..... 0.57735
SIN(PI/4) ..... 0.70711
SIN(PI/6) ..... 0.16667
SIN(PI/12) ..... 0.25982
SIN(PI/15) ..... 0.20711
SIN(PI/18) ..... 0.17365
SIN(PI/20) ..... 0.15643
SIN(PI/24) ..... 0.13438
SIN(PI/30) ..... 0.10423
SIN(PI/36) ..... 0.08333
SIN(PI/45) ..... 0.05209
SIN(PI/54) ..... 0.03442
SIN(PI/60) ..... 0.02618
SIN(PI/72) ..... 0.01961
SIN(PI/90) ..... 0.01103
SIN(PI/108) ..... 0.00833
SIN(PI/135) ..... 0.00521
SIN(PI/162) ..... 0.00370
SIN(PI/180) ..... 0.00262
SIN(PI/225) ..... 0.00167
SIN(PI/270) ..... 0.00111
SIN(PI/324) ..... 0.00077
SIN(PI/360) ..... 0.00055
SIN(PI/405) ..... 0.00040
SIN(PI/450) ..... 0.00029
SIN(PI/540) ..... 0.00021
SIN(PI/600) ..... 0.00015
SIN(PI/675) ..... 0.00011
SIN(PI/720) ..... 0.00008
SIN(PI/810) ..... 0.00006
SIN(PI/900) ..... 0.00004
SIN(PI/972) ..... 0.00003
SIN(PI/1080) ..... 0.00002
SIN(PI/1215) ..... 0.00002
SIN(PI/1350) ..... 0.00001
SIN(PI/1440) ..... 0.00001
SIN(PI/1620) ..... 0.00001
SIN(PI/1800) ..... 0.00001
SIN(PI/2025) ..... 0.00001
SIN(PI/2160) ..... 0.00001
SIN(PI/2250) ..... 0.00001
SIN(PI/2430) ..... 0.00001
SIN(PI/2700) ..... 0.00001
SIN(PI/3024) ..... 0.00001
SIN(PI/3240) ..... 0.00001
SIN(PI/3600) ..... 0.00001
SIN(PI/4050) ..... 0.00001
SIN(PI/4500) ..... 0.00001
SIN(PI/5040) ..... 0.00001
SIN(PI/5400) ..... 0.00001
SIN(PI/6000) ..... 0.00001
SIN(PI/6750) ..... 0.00001
SIN(PI/7200) ..... 0.00001
SIN(PI/8100) ..... 0.00001
SIN(PI/9000) ..... 0.00001
SIN(PI/9720) ..... 0.00001
SIN(PI/10800) ..... 0.00001
SIN(PI/12150) ..... 0.00001
SIN(PI/13500) ..... 0.00001
SIN(PI/14400) ..... 0.00001
SIN(PI/16200) ..... 0.00001
SIN(PI/18000) ..... 0.00001
SIN(PI/20250) ..... 0.00001
SIN(PI/21600) ..... 0.00001
SIN(PI/22500) ..... 0.00001
SIN(PI/24300) ..... 0.00001
SIN(PI/27000) ..... 0.00001
SIN(PI/30240) ..... 0.00001
SIN(PI/32400) ..... 0.00001
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SIN(PI/45000000) ..... 0.00001
SIN(PI/50400000) ..... 0.00001
SIN(PI/54000000) ..... 0.00001
SIN(PI/60000000) ..... 0.00001
SIN(PI/67500000) ..... 0.00001
SIN(PI/72000000) ..... 0.00001
SIN(PI/81000000) ..... 0.00001
SIN(PI/90000000) ..... 0.00001
SIN(PI/97200000) ..... 0.00001
SIN(PI/108000000) ..... 0.00001
SIN(PI/121500000) ..... 0.00001
SIN(PI/135000000) ..... 0.00001
SIN(PI/144000000) ..... 0.00001
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SIN(PI/202500000) ..... 0.00001
SIN(PI/216000000) ..... 0.00001
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SIN(PI/302400000) ..... 0.00001
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SIN(PI/405000000) ..... 0.00001
SIN(PI/450000000) ..... 0.00001
SIN(PI/504000000) ..... 0.00001
SIN(PI/540000000) ..... 0.00001
SIN(PI/600000000) ..... 0.00001
SIN(PI/675000000) ..... 0.00001
SIN(PI/720000000) ..... 0.00001
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SIN(PI/6750000000) ..... 0.00001
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SIN(PI/18000000000) ..... 0.00001
SIN(PI/20250000000) ..... 0.00001
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SIN(PI/67500000000) ..... 0.00001
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SIN(PI/50400000000000000) ..... 0.00001
SIN(PI/54000000000000000) ..... 0.00001
SIN(PI/60000000000000000) ..... 0.00001
SIN(PI/67500000000000000) ..... 0.00001
SIN(PI/72000000000000000) ..... 0.00001
SIN(PI/81000000000000000) ..... 0.00001
SIN(PI/90000000000000000) ..... 0.00001
SIN(PI/97200000000000000) ..... 0.00001
SIN(PI/108000000000000000) ..... 0.00001
SIN(PI/121500000000000000) ..... 0.00001
SIN(PI/135000000000000000) ..... 0.00001
SIN(PI/144000000000000000) ..... 0.00001
SIN(PI/162000000000000000) ..... 0.00001
SIN(PI/180000000000000000) ..... 0.00001
SIN(PI/202500000000000000) ..... 0.00001
SIN(PI/216000000000000000) ..... 0.00001
SIN(PI/225000000000000000) ..... 0.00001
SIN(PI/243000000000000000) ..... 0.00001
SIN(PI/270000000000000000) ..... 0.00001
SIN(PI/302400000000000000) ..... 0.00001
SIN(PI/324000000000000000) ..... 0.00001
SIN(PI/360000000000000000) ..... 0.00001
SIN(PI/405000000000000000) ..... 0.00001
SIN(PI/450000000000000000) ..... 0.00001
SIN(PI/504000000000000000) ..... 0.00001
SIN(PI/540000000000000000) ..... 0.00001
SIN(PI/600000000000000000) ..... 0.00001
SIN(PI/675000000000000000) ..... 0.00001
SIN(PI/720000000000000000) ..... 0.00001
SIN(PI/810000000000000000) ..... 0.00001
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SIN(PI/972000000000000000) ..... 0.00001
SIN(PI/1080000000000000000) ..... 0.00001
SIN(PI/1215000000000000000) ..... 0.00001
SIN(PI/1350000000000000000) ..... 0.00001
SIN(PI/1440000000000000000) ..... 0.00001
SIN(PI/1620000000000000000) ..... 0.00001
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SIN(PI/2025000000000000000) ..... 0.00001
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SIN(PI/2430000000000000000) ..... 0.00001
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SIN(PI/3024000000000000000) ..... 0.00001
SIN(PI/3240000000000000000) ..... 0.00001
SIN(PI/3600000000000000000) ..... 0.00001
SIN(PI/4050000000000000000) ..... 0.00001
SIN(PI/4500000000000000000) ..... 0.00001
SIN(PI/5040000000000000000) ..... 0.00001
SIN(PI/5400000000000000000) ..... 0.00001
SIN(PI/6000000000000000000) ..... 0.00001
SIN(PI/6750000000000000000) ..... 0.00001
SIN(PI/7200000000000000000) ..... 0.00001
SIN(PI/8100000000000000000) ..... 0.00001
SIN(PI/9000000000000000000) ..... 0.00001
SIN(PI/9720000000000000000) ..... 0.00001
SIN(PI/10800000000000000000) ..... 0.00001
SIN(PI/12150000000000000000) ..... 0.00001
SIN(PI/13500000000000000000) ..... 0.00001
SIN(PI/14400000000000000000) ..... 0.00001
SIN(PI/16200000000000000000) ..... 0.00001
SIN(PI/18000000000000000000) ..... 0.00001
SIN(PI/2025000000000000
```

LISTING 1

```

40 00000000 LDA #000
45 000 0000
50 000 0000
55 000 0000
60 000 0000
65 000 0000
70 000 0000
75 000 0000
80 000 0000
85 000 0000
90 000 0000
95 000 0000
100 000 0000
105 000 0000
110 000 0000
115 000 0000
120 000 0000
125 000 0000
130 000 0000
135 000 0000
140 000 0000
145 000 0000
150 000 0000
155 000 0000
160 000 0000
165 000 0000
170 000 0000
175 000 0000
180 000 0000
185 000 0000
190 000 0000
195 000 0000
200 000 0000
205 000 0000
210 000 0000
215 000 0000
220 000 0000
225 000 0000
230 000 0000
235 000 0000
240 000 0000
245 000 0000
250 000 0000
255 000 0000
260 000 0000
265 000 0000
270 000 0000
275 000 0000
280 000 0000
285 000 0000
290 000 0000
295 000 0000
300 000 0000
305 000 0000
310 000 0000
315 000 0000
320 000 0000
325 000 0000
330 000 0000
335 000 0000
340 000 0000
345 000 0000
350 000 0000
355 000 0000
360 000 0000
365 000 0000
370 000 0000
375 000 0000
380 000 0000
385 000 0000
390 000 0000
395 000 0000
400 000 0000
405 000 0000
410 000 0000
415 000 0000
420 000 0000
425 000 0000
430 000 0000
435 000 0000
440 000 0000
445 000 0000
450 000 0000
455 000 0000
460 000 0000
465 000 0000
470 000 0000
475 000 0000
480 000 0000
485 000 0000
490 000 0000
495 000 0000
500 000 0000
505 000 0000
510 000 0000
515 000 0000
520 000 0000
525 000 0000
530 000 0000
535 000 0000
540 000 0000
545 000 0000
550 000 0000
555 000 0000
560 000 0000
565 000 0000
570 000 0000
575 000 0000
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620 000 0000
625 000 0000
630 000 0000
635 000 0000
640 000 0000
645 000 0000
650 000 0000
655 000 0000
660 000 0000
665 000 0000
670 000 0000
675 000 0000
680 000 0000
685 000 0000
690 000 0000
695 000 0000
700 000 0000
705 000 0000
710 000 0000
715 000 0000
720 000 0000
725 000 0000
730 000 0000
735 000 0000
740 000 0000
745 000 0000
750 000 0000
755 000 0000
760 000 0000
765 000 0000
770 000 0000
775 000 0000
780 000 0000
785 000 0000
790 000 0000
795 000 0000
800 000 0000
805 000 0000
810 000 0000
815 000 0000
820 000 0000
825 000 0000
830 000 0000
835 000 0000
840 000 0000
845 000 0000
850 000 0000
855 000 0000
860 000 0000
865 000 0000
870 000 0000
875 000 0000
880 000 0000
885 000 0000
890 000 0000
895 000 0000
900 000 0000
905 000 0000
910 000 0000
915 000 0000
920 000 0000
925 000 0000
930 000 0000
935 000 0000
940 000 0000
945 000 0000
950 000 0000
955 000 0000
960 000 0000
965 000 0000
970 000 0000
975 000 0000
980 000 0000
985 000 0000
990 000 0000
995 000 0000

```

These values are quite handy and save you the tedium of creating your own constants. LISTING 2 shows how they can be used.

LISTING 2

```

30 JNR 00A00
40 JNR 00A02
50 JNR 00A02
60 RTS
70 LDA # 0A0
80 LIR # 0A0
90 JNR 00A02
100 RTS

```

Lines 10 to 40 load FAC1 with a random number and multiply it by 00 FAC1 (constant holds between zero and 99). The remainder of LISTING 2 loads FAC1 with the value of PI.

From these examples you should see that floating-point operations aren't that difficult to use. They are, as I've said before, very slow.

If you try using the random-numbered values, you'll find it's just as

slow as machine code as from these.

If you want to generate a random number, there are factors you can play with using floating-point numbers. First, you can use the value held in the external clock. This is ideal in BASIC but at machine-code speeds, it's a pain. The best source of random numbers is the white noise generated in the sound chip. Consider LISTING 3.

LISTING 3

```

10 LDA # 0FF
20 STA 00A00
30 STA 00A0F
40 LDA # 0A0
50 STA 00A02
60 STA 00A08
70 LDA 00A0B
80 RTS

```

Lines 10 to 30 set the frequency to the highest possible value. Line 30 selects white noise as wave 3, line 40 turns off the noise output of wave 3. Line 50 extracts a random number based on the amplitude of the waveform in voice 3. I find this method very efficient and time independent.

Well, that's pretty well finished out now as the ROMs. If you look at a decent disassembly of the ROMs, you will find many other useful routines and will derive many hours of harmless amusement.

You may have wondered why only a fraction of the possible 256 instructions are implemented on the 6502. In fact, it appears that some other codes do have a function. I must warn you that these instructions are unaffiliated and I cannot guarantee that the codes will function properly but you can try debbling with them.

First, there are a collection of additional NOPs. You will already know that NOP is a no-operation instruction which can be used to leave space in code or reduce timing loops. There are in fact one byte, two byte and three byte NOPs.

One Byte NOPs

The usual instructions used for NOP is BEA. This instruction is also performed by the instructions BEA,STA,SEA,STA,SEA,STA.

Two Byte NOPs

This instruction is not only ignored but also does nothing else. The following bytes perform the function: BEA,SEA,SEA,SEA,SEA,SEA,SEA,SEA,SEA.

Three Byte NOPs

This instruction is ignored plus the following two bytes. The relevant instructions are: SOC,SIC,SIC,SIC,SOC,SOC,SFC.

The value of these instructions are that they are ignored by normal disassemblers and are therefore useful if you want to make your code difficult to decode. Let us consider a simple example. LISTING 4 prints an asterisk at the current cursor position.

LISTING 4

```

10 LDA # 00A
20 JNR 00F00
30 RTS

```

Let us insert the bytes 00A and 00B between lines 10 and 20.

LISTING 5

```

10 LDA # 00A
15 BTE 00A,00B
20 JNR 00F00
30 RTS

```

The 00A is a two byte NOP in that it is ignored as is the 00B (BTE). This means that the additional bytes are ignored and the routine runs as required. If we try to disassemble the code, however, we get the error given in LISTING 6.

LISTING 6

```

10000 LDA # 00A
10005 BTE
10010 BTE
10015 JNR 00F00
10020 RTS

```

If this is repeated at one or two other places in the code, you can see that the code would become rather tough to decipher.

In TABLE 2, I've listed some other instructions. There are other instructions but I've tried to list the most useful. The validity of these instructions are uncertain since they were derived from the ASM. I'm sure, however, that you'll enjoy dabbling to see if they work on your 68.

TABLE 2

Op Code	Function	Address
60	ASL (R,X) ORA (R,X)	
61	ASL R,X ORA R,X	
62	ASL (R,X),Y ORA (R,X),Y	
63	ASL R,X ORA R,X	
64	ASL (R,X),X ORA (R,X),X	
65	LDX R,X LDA R,X	
66	LDX R,X,Y LDA R,X,Y	
67	DEC R,X CMP R,X	
68	DEC (R,X) CMP (R,X)	
69	DEC (R,X),Y CMP (R,X),Y	
6A	DEC R,X,Y CMP R,X,Y	
6B	LDA (R,X) LDX (R,X)	
6C	LDA (R,X),Y LDX (R,X),Y	

Remember, I cannot take any responsibility for any problems you may have if you choose to use these codes. They are really more of curiosity value than anything else.

In this series I've tried to show that there is no shortcut to machine code. On the contrary, if you've developed any programming habits you should find it easy to see. The only manner in that unlike high level languages, machine code forces you to develop an understanding of the hardware to get the best results. But that isn't such a bad thing, is it? Anyway, here's wishing you many hours of successful programming.

Homework

Last month I gave you a choice of homework. Hopefully the more creative readers will have tackled both. Here are my solutions without any comment (I'll leave it to you to see them out).

First, a routine to extract the first and last words from an input string. I've used the screen to provide the various text buffers so that you can see a function.

```

40 TESTSTART = $C400-000
50 TESTLEN = 000
60 VERBUFFER = TESTSTART+000
70 WORDLEN = 011
80 WORDOFFER = TESTSTART+000
90 WORDLEN,010
100 $SETLW LDA #0
110 $SETLW #0
120 LOOP1 STA TESTSTART,Y
130 STA WORDOFFER,Y
140 STA TESTSTART,Y
150 $SETLW #0
160 CPT #00
170 $BNE LOOP1
180 LDA #0
190 STA WORDLEN
200 STA WORDOFFER
210
220 TESTLEN LDA #0+1
230 $SETLW #0
240 LDA #1
250 $SETLW #0
260 $SETLW #0
270 LOOP1 $SETLW #0
280 $SETLW #1
290 $SETLW #0
300 STA TESTSTART,Y
310 $SETLW #0
320 LOOP1 LDA #0
330 STA TESTSTART,Y
340 $SETLW #0
350 $SETLW #0
360 $SETLW #0
370 $SETLW #0
380 $SETLW #0
390 $SETLW #0
400 $SETLW #0
410 $SETLW #0
420 $SETLW #0
430 $SETLW #0
440 $SETLW #0
450 $SETLW #0
460 $SETLW #0
470 $SETLW #0
480 $SETLW #0
490 $SETLW #0
500 $SETLW #0
510 $SETLW #0
520 $SETLW #0
530 $SETLW #0
540 $SETLW #0
550 $SETLW #0
560 $SETLW #0
570 $SETLW #0
580 $SETLW #0
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660 $SETLW #0
670 $SETLW #0
680 $SETLW #0
690 $SETLW #0
700 $SETLW #0
710 $SETLW #0
720 $SETLW #0
730 $SETLW #0
740 $SETLW #0
750 $SETLW #0
760 $SETLW #0
770 $SETLW #0
780 $SETLW #0
790 $SETLW #0
800 $SETLW #0
810 $SETLW #0
820 $SETLW #0
830 $SETLW #0
840 $SETLW #0
850 $SETLW #0
860 $SETLW #0
870 $SETLW #0
880 $SETLW #0
890 $SETLW #0
900 $SETLW #0
910 $SETLW #0
920 $SETLW #0
930 $SETLW #0
940 $SETLW #0
950 $SETLW #0
960 $SETLW #0
970 $SETLW #0
980 $SETLW #0
990 $SETLW #0

```

Second is a simple text compression routine. As a bonus, I've added a decoding routine. The three characters, are input in C1 C2 and C3. The encoded data is returned in B1 and B2. If you want to use it, simply assign the alphabet to characters 1 to 26. The remaining 3 characters can be used for punctuation (e.g. ?/ and space). If

```

20 C1 = 000
30 C2 = 001
40 C3 = 010
50 B1 = 000
60 B2 = 000
70 ;
80 ;
900 ENCODE ASL CHAR2
910 ASL CHAR2
920 ASL CHAR2
1000 ASL CHAR2
1010 ROL CHAR1
1020 ASL CHAR2
1030 ROL CHAR1
1040 ASL CHAR2
1050 ROL CHAR1
1060 LDA CHAR1
1070 STA B1
1080 ASL CHAR3
1090 LDA CHAR3
1100 STA CHAR3
1110 STA B2
1120 ;
1200 DECODE LDA B1
1210 AND #111111000
1220 LSR A
1230 LSR A
1240 LSR A
1250 STA CHAR1
1260 LDA B2
1270 AND #100111111
1280 LSR A
1290 STA CHAR3
1300 LDA B1
1310 AND #100001111
1320 ASL A
1330 ASL A
1340 STA CHAR2
1350 LDA B2
1360 AND #111000000
1370 LSR A
1380 LSR A
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Blow Your Own

Imagine being able to make your own cartridges for the Commodore. Until now this has been a preserve of the enthusiast. Now Sircal bring the advantages and convenience of cartridges to the common man.

By Mycroft Appleby

The principal cartridge is a very simple device. A read only memory (ROM) on a small board that brings the connections of the ROM into an edge connector and a simple plastic case that provides a convenient housing to protect its contents and make sure that the ROM is connected to the computer the right way round.

The difficulty comes when manufacturing the cartridges. To create a useful ROM you have to physically build in the program at the time when the chip is actually made - economically answered for numbers less than 20000, and who can guarantee sales of that number to the computer market? Also the cost of manufacturing a cartridge is many times the cost of duplicating it later. The old 'one amongst us' will remember the £10 £80 for VCS cartridges 2-3 years ago. Commodore solved these cost problems by manufacturing their own chips - resulting in around £10 for a Commodore cartridge. Nobody else could compete and the cartridge prices are flat as we know it collapsed for the moment in 1982. Commodore has sold 10 Million cartridges for the Nintendo machine - but that's another story.

There is another way of making cartridges, not another market to buy them - EPROMs and ROMs. An EPROM is similar to an ordinary

ROM and is functionally identical in far as the computer is concerned. However it can be programmed after manufacture and erased. The programming and erasing isn't like a normal read/write memory such as a Random Access Memory but must use a special programmer and eraser. The eraser will wipe the chip in about 30 minutes by shining UV light through a small window in the top of it. Programming is accomplished by plugging it into a programmer which can fill a chip in about 15 minutes.

The programing speed means a chip can be carried out about 100 times before the chip 'wears out'. The chip will retain its contents for about 100 years before it needs reprogramming enough for most applications I think - unless you have some valuable Verano software that's about to arrive!

Utility cartridges are still available, and if you look inside one of them you will see that they will usually contain EPROMS. They are usually utility cartridges because utilities generally have very small production runs, and EPROMs are suitable for low volume production.

SIRC owners are very well served with EPROMS as the machine has some spare sockets that they just fit into. Commodore owners not so much as. This is mainly due to having no fixed

an EPROM programmer (called a blower), an eraser (called a deprogrammer), a supply of empty cartridges and some EPROMs, then trying to load all the necessary software and the skill and information to use it. A daunting task for anybody not completely skilled in the art.

Sircal has a new product called the uneprommed (and more expensively) used in the form of a complete cartridge creating kit. Comprising of a programmer that fits on to the user port of the Commodore 64, a read alone IC it doesn't need to plug into anything except the uneprommed deprommer, comprehensive driver software (on cartridge - of course!), and a blank cartridge. The blank cartridge is identical to a normal cartridge except for one or two differences that allow the EPROM mode it to be programmed without taking it out, and a small hole that has the UV light shine into it to reprogram the cartridge when its time is done.

Blank cartridge sets for expenses at £20 each but after a while possibly always making your own as the chips are only £2 a throw with the empty cartridges in about the same. The cartridges are also only £8K in size and with the 10000-15000 even an economy - reserved for the use of external cartridges while keeping those above 16K cartridges will be made available

if there is enough demand, there are between £800 and £C000 and page out Basic for applications that don't need it.

The cartridge can be programmed in two ways - Basic or machine code. The machine code method can be used to make an auto-start cartridge - like a Basic loader or a game. And all the formatting and loader codes are up to you. The Basic method has all the hard work done for you and will take a Basic program and put it onto the cartridge where it can be instantly recalled for later use. All the loader codes and the software needed to reload the program are written into the cartridge by the opening software - so you don't have to worry about it being.

The opening software is easy to use, straightforward, and well explained. In the short, but informative manual. My only gripe is with the error

With this you plug the cartridge into it to erase and a small LED shows you when the time is up for erasing (too long reduces the life of the EPROM, too short and it doesn't erase properly). My gripe is that the gap between the socket and the cartridge is not very good and some of the light leaks out. You may think that this is not all that important - but the wavelengths that you need to erase an EPROM can damage your eyes. Serial says that they think it's safe, but

There is an interlock which prevents you turning the eraser on without the cartridge in place, but I would have preferred something a little better just for peace of mind.

Overall this is a great package for creating cartridges for either your own use or for limited distribution. For a low cost/low risk though, I would recommend getting your own EPROM blowing system where you could just

use a standard EPROM and a normal EPROM blower, just because of the relatively high cost of this system. However for a multiple installation such as a school or college I think that this system is excellent and I'm sure that systems with that type of installation could think up many ideas for customised machines with easily changeable ROM software. The only bad points are the small size of the cartridges - 1K isn't a lot for a program nowadays. And the inability to change the mapping - so that it can override the operating system for instance, has a lot of disk surface de-allocated a well thought out product.

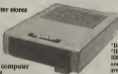
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Extended Basic

We provide a table for all the Commands for last month's FREE Extended Basic

Because we presented the instructions for one Free Extended Basic in an article a few of you are having problems sorting out all the different commands. We are therefore pleased to print a table of all of the available commands together with their syntax.

COMMAND REM/MLIST	ACTION Resume program x = start line number (0 for all programs) y = increment z = new start number Automatic line number generation	TROFF	Turn off TRACE command
AUTOxy	x = start line number y = increment RETURN to quit	DISK B-Dn	Display disk directory x = drive number Send a disk command "command" = standard Commodore disk commands
DElay	x = start line number y = increment RETURN to quit	D-Bn	Display disk error binary to decimal conversion x = a binary number
DUMP	Display values of all variables used in a program	D-Hn	Decimal to binary conversion x = a decimal number
KEY	Display contents of function keys	D-Hn	Decimal to hex conversion x = a decimal number
KEYs,"text"	Program function keys x = key number text = string to be programmed. For a space in the text use shifted space. For an an asterisk use RETURN add x = to the end of text	H-Dn	Hex to decimal to octal x = a hexadecimal number
OFF OLD	Turn OFF function keys Resume a NEWed program	MERGE "name".dev	Merge program "name" into program already in memory dev = device number
PAUSE	Modify LIST command SHIFT will now pause the listing	APP "name".dev	Append program "name" to the end of program already in memory dev = device number
TRACE	TRACE program execution Press space for next line or a number to alter speed of trace	MLOAD "name".d1,x	LOAD a program into any area of memory "name" = the program name d = device number x = start address for LOAD
		MSAVE "name".d1,x	"name" = the program name d = device number x = start address
		MEM	x = end address +1 Display memory available
		HI addr	Set top of memory to addr

FREE SOFTWARE

LOAD	Set buttons of memory to zero	[E] (BLK)	CBM + 7
CODE	Translate all Commodore graphics in program to numbers	[GRJ]	CBM + 8
	NO program will not RUN after this command.	[REY]	REVERSE ON
	Leave the Expanded Basic SYS 4910 to restart	[OFF]	REVERSE OFF
QUIT		Cursor Control	
	The following table displays the instructions that are added to a program after the CODE command.	[CR]	CURSOR RIGHT
	All codes appear within square brackets	[LL]	CURSOR LEFT
		[CU]	CURSOR UP
		[CD]	CURSOR DOWN
		[HDM]	CURSOR HOME
		[CLS]	CLEAR SCREEN
		Function Keys	
		[F1], [F2], [F3] etc.	
		Control Codes	
		[CTRL-letter] —	CONTROL KEY + letter eg [CTRLA]
		Graphics Characters	
		[G > letter]	SHIFT + letter
		[G < letter]	[G] screen graphics
		[F] —	CBM + letter
		A number before the code means that you should press the key that many times	[F] character
		0 =	
		[MCD] means: press cursor down 10 times	
		[MGT-24] means: press SHIFT + 5-15 times	

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Games Reviews

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ASTERIX

If you're sick to death of the usual futuristic space battle shoot 'em up type of game then this game makes a pleasant change. Asterix takes you back over 2000 years to the time of the Romans and the Gauls.

Asterix is the Gauls hero (or at least he will be if you do) who has managed to escape with his friend Obelix but to get on and find their people at a missing stage, you'll have to travel through the world that you've just escaped from, getting to help the Gauls stand against the Romans.

In this arcade adventure, Asterix, must wander around the countryside battling against wild pigs and Romans. If the Gauls are beaten they turn themselves into real comestible items which are useful for keeping Obelix by your side.

You may find it useful to map your route around the playing area as several paths seem to lead to the same locations. Unfortunately the screen doesn't move as quick as Asterix so there is quite a pause while the next screen is drawn. Asterix simply hangs in limbo until the programme finishes drawing the screen, or perhaps this is when he trips off to the gods.



When fighting with Asterix, or the bears, a blow up screen lets yourself and you opponent appear on the screen. Experiences that you can see exactly where you are hitting and being hit, or more probably where he is hitting you.

I think that in the fighting sequence, every movement of you or the opponent, being/hanging to do, is set game actions, like punch, kick and kick down to a rocky or wooden floor, being debilitated over the head by a Roman's

axe. You're not a hero for being a coward, but I must admit that the hero's strategy I found while playing was simply to let your opponent wear out the ROM.

Despite its excellent graphics, Asterix has limited playing interest. For a start all of the pieces of the landscape appear to be the same place, once you've found where they all are and you've mastered the lightning techniques you will find the game extremely dull.

Oh, and there's also a small bug, well quite a big one really, that one time you're about to kill the missing piece of the landscape within a couple of minutes of starting the game, but I'll leave you to find out what it is.

Square graphics and mouse are let down by the actual game. Still if you remember the TV series and the comic strips of Asterix, then you can enjoy this game for a while. **J.G.**

Publisher

Victor Astute, Mackerel C44 Computer Multimedia
House 48 Wych Street, Wapping Road, London, Essex
ATJ 008 767 81 947.897
Commodore 8000 Plus/64000 4700 Graphics 8100 Leds
5/10

THAT BONES

Yet another combat simulation on a sport or yet only covered by one of the other software houses. The theme that distinguishes *That Bones* from its more immediate wire counterpart in the ring only is it has game to let your opponent. You can also kick him. He will give a fist and his own boxing match with added violence.

Bones normally takes part in a boxing ring, but because there are progressively better bones has provided six different backdrops, on a slightly unusual theme, each one representing an extra level of skill. Unless you wear a 128 there, you're not loaded on top of a bar, to make sure that you keep your ground on your ankles, remember. The high score table can also be used if you are particularly proud of your achievements.

There are 12 different moves to be mastered. Normal movement of the joystick will move you forward, backward or make you jump or crouch. Pressing the fire button gives you to a high and low punch, high, low, throw and empty kicks as well as two different movements on which you can protect your head or your body. The character, although



lately until you've killed every enemy. You find a few places near there with treasure chests, although it can be less if one person gets out of range. At the end of each round, the players shift position so that you can get a slightly different perspective. There are the usual one or two player options.

There is nothing particularly commendable about this game but nothing dreadful either. Its appeal though is likely to be limited to fans of combat simulation. **C B 3/4**

TOUCHLINE

Name: *The Binding of Isaac* Company: *Devolver Digital* 4 Westgate House, South Street, Dergford, Kent DA1 2JW Tel: 01222 92703 Price: £7.99 (steam), £9.95 (dvd) Operating: 4/10 Graphics: 3/10 Playability: 3/10 Value: 4/10

GODS AND HEROES

A couple of months ago I reviewed a game called *Assholes*, a remarkably difficult platform game. The main characters levelled against it, but those who (let's confess and stress) don't like it, were then all too often you had to step into the unknown in hoping that a platform would miraculously appear underneath you at the crucial moment. They thought that there was too much trial and error involved so you frequently had no time at all to think. Well, Alpha Omega has just released the sequel called *Gods and Heroes* and it is every bit as good a game as the original, with the added bonus that you can now see a lot more on the screen to help you plan your route, through each of the 40 challenges. It is still however, impossibly difficult.

Continuing the classical theme, the Gods are playing games with the Greek Superheroes. All those tasks of maze like Jason and Hercules were no more than mortal wishes designed to annoy the inhabitants of Olympus. To see how you would fare on the Ancient Greek equivalent of the Kraption Factor, you are invited to try your hand at solving the 30 puzzles that have been set before you.

The objects of each puzzle is to reach a specific item - a cube, sword or an axe are typical examples. There are platforms to be leapt on to, mechanical monsters to be avoided and ropes to be swung from but be warned everything is not as it seems. Some platformer basic two

flames as soon as you step on them. Ropes usually do your touch plunging you to your doom. And there are other problems as well. All the superheros may be a god having designed to lose you lives. A platform that is usually invisible may lead directly to your death when you step here to construct extra platforms out of building blocks.

As well as eight different speed levels to choose from and one or two play options, you can choose which of the 40 levels you want to start from. This is an excellent idea as there are many areas when you know what you want to do but are unable to find a way of doing it. There is nothing more than being stuck on level two knowing that there is a solution 40 or so levels down. The graphics rival the best in the world but will ultimately better than the original. The music is



but some puzzle solving and action is put right and there is a constant feeling of just one more token. All in all a great little game, especially for the price. **C B 3/4**

TOUCHLINE

Name: *Gods and Heroes* Company: *Alpha Omega* 4 Kings Ford, Capenhurst Road, London E15 2JQ Tel: 01 40 331 2344 Price: £1.99 (steam), £4 Graphics: 4/10 Playability: 3/10 Value: 3/10

SINBAD

As *Sinbad* you are the hero must break out of your dungeon, rescue your treasure and do battle with various monsters until eventually you meet the tale and evil Sultans, who forced you all the way to the first place.

On the surface this appears to be just another platformer/beat everything that moves type of game. However, *Sinbad* really is a very difficult game to master. The game is played over five scenarios, each one needing a password to gain access to it (except scenario one and scenario five, which is a continuation of four). The treasure I liked. There's nothing more than, after successfully getting past one difficult screen, you have to do it all again should you die. Each level has its own particular degree of difficulty.

At the start of the game, you have to break out of your dungeon by unlocking two doors with two keys that you obtain. To obtain a key you need to collect eight of your

confused treasure. There is no hint to reward if treasure that you can carry, but you are only allowed to carry one key at a time. To hinder you in your task are birds (particularly nasty), snakes and Sacred lookalikes. If this wasn't enough, there are numerous peaking walls to navigate. These need epic-accused timing and nimble fingers on the joystick.

Scenes two is a straight forward platform scene (Straight forward did I say?) You have to kill off a certain number of the guards who appear from behind the door, using a red which you have magic levels obtained. One hit proves fatal for these guards, whilst you on the other hand can sustain up to four hits before you die. You can recover your lost one up by collecting a golden statue, these appear at random. However, one guard is a very nasty fellow, one touch here has meant instant death for you, and the recovery of a couple of dead guards.

Scene three is perhaps the easiest scene of all, but by no means a walkover. The object here is to guide fire of your own safety, across the desert whilst fighting off all sorts of evil living things. Shooting your own kind will speed things, but should be be hit, anything else, then watch that timer drop. When firing remember (remember that all the time you have your finger on the fire button, you can guide your fire to its target). To compensate for this though you are restricted to the bottom 10 lines of the screen. So accuracy is vital!

Scenes four and five make up our scenario. On four you have to chase down the over-powered living corpse and her hench. The guards on the carpet (I'll come for you, whilst the rocks take three - beware of falling rocks! After a certain number have been degraded and in the fifth scene being exactly type, he reappears himself also a fire breathing dragon and shows death breaths at you.



One thing that I think is done to the absolute right, you don't only have the rather lengthy road program, you also have a timer counting down from 999. This moves very rapidly so don't hang around wondering what is the time is about.

Overall, I think this game tremendously. Some of the scenes were almost impossible to complete within the given time, but this is the challenge. The graphics are easily presented, and the music, although not in the best of the best, but Delightful, yes, is pleasant to listen to.

One small criticism is the fact that disk saves cannot save on high scores.

TOUCHLINE

Name: Sacred Company, Sapporo, Japan; Mail, Skinner La, Leeds Post 46-80, Machine C64
 (Demos): ATB (Machin), D18, Graphics, D18, Editor, B18



DANTE'S INFERNO

In this ever changing world of computer games, with every day's scenario comes. There are a few producers of software that are consistently good. One of these companies is Dante's Design, which behind Dante's Inferno, and was therefore waiting eagerly for this program to land in. Not enough in a few seconds came the familiar superb loading picture.

When the program did eventually start, I thought to myself, "Oh no, not another Robot of the Wood type Graphic Adventure!" Undaunted, I carried on and to my pleasant surprise I'm glad to say, that it is not the Real Wyrde, the same type and quality of graphics, but there the similarity ends. For this program is completely different to most.

For a start, you need to make decisions quickly and accurately. The main objective is to pass through the various rooms of hell until you come face to face with Lucifer himself. Aiming and shooting your, or handling you as the case may be, at a large assortment of enemy evil creatures. Your job is to find objects with which you can help these creatures.

The manipulation and use of the objects takes some time to control. Precise when still as Lumber. (The first scene) on how to use and manipulate them is advisable. Telling you how to use them would spoil the fun of finding out for yourself. Be prepared to die often in the start, this is very frustrating, but don't let this put you off. Once you have entered the first few scenes you will agree that it was worth persevering with it.

Knowing a little of the story of Dante will undoubtedly help you finish this game.

The playing area is quite large and very well presented. The problems are not easy to solve, but a little intelligent thought will clear the maze for you. There are a total of nine mazes for you to pass through before you meet the main himself. Good luck to you. And as they say in all good mazes, IT'S NOT YOU, IT'S ME!

P. R.

TOUCHLINE

Name: Dante's Inferno Company, Sapporo, Withagon House, Upper St Martin's Lane, London WC2E 7TF
 2795 Post 28-92, Machine C64
 (Demos): ATB (Machin), B18, Graphics, D18, Editor, B18

THE GOLD BATTLE

Multiple event sports games have been around for a long time now and *Go for Gold* is no exception. Originally released on the game's a couple of years ago, it got very little attention which is a pity because it is one of the best games of its type ever released. And to be able to buy it for less than three pounds has got to be one of the bargains of the year.



It gives players an complete sports one another with each one, going to select the values of his or her kit. There are six events to compete in - a complete season of events being required if you are going to win the big C. Your first chance to make a splash is quite literally that, springboard diving. You start from the jumping up and down on the board for movement effect as well as deciding where to come out of your dive and whether or not you are going to dive forwards or backwards. If you are feeling especially clever, you can nominate the dive that you are going to perform (make a lower number when you jump and see what happens) and score an extra 10%.

The 100m sprint and 110m hurdles are two very similar events. The former involves you wiggling the joystick from full straight on (as if you can hold the lane) to the same with added extra that your joystick should be to the right when you reach a hurdle so that you stop up and get viewed down. The program is equipped to watch out for false starts too so can't cheat as you go for the record.

Hand and eye co-ordination are top and if you are to be on target for the next event - archery. Six arrows at four or target of varying distances. You must take wind speed and direction into account and should also try to shoot quickly for the longer you delay the more wind your arrow get and the harder it is to aim properly.

Speed and timing are the crucial elements of a successful long jump. You must run as fast as you can towards the board and then time your leap at just the right moment. Even then you can't take it as you must stand on time to throw yourself forward on landing in order to give three precious extra inches.

The final event is weight lifting which is divided into two sections, the snatch and clean and jerk. The power lifting comes from the thighs and timing is crucial if you are going to get those huge weights above your head. Everything is carefully controlled from your joystick and you get a sense of what is involved for the clean and jerk with the

two events, all of which must be timed to perfection. Down up down, pause up pause down up, down (fast) fast pause up. This sequence brings the bar up on to your chest and then power it up so that you drop down onto one knee before finally standing upright. Well that's the theory.

One of the nice things about *Go for Gold* is the built in coach. As you increase the weights, so you see the large weights going on the bar. There is a real feeling of your hands shaking in the weights and the barbell sledge as the weight is slung and sent up in the air, it is so fast you are in front of him. He is there to appear to be there if you want and if you are ever get those spectacular lifts (top on or not) over you.

This is far and away the best game released under the American title so far. From someone whose only interest is watching his watch up on the morning, all I can do is suggest that you go and get a copy today. C.R.H.

TOUCHLINE

Name: *Go For Gold* Company: US Gold/American
Price: £25 (Region 1), Mafford, Buckingham RG2 7BN
Tel: 012 330 2188 Price £2.99 Market: CH
Developer: US Gold Company: US Gold/American
1990/91

ONAN

When playing games if I want a good adventure jumping about on a play about 'em up, that is really good problem period adventure I play *Onan*. To bring out the suspense and excitement in the it is a good quality game that for sheer relaxation and fun there is no got to be the good old platform game. *Onan* is just that.

As in all platform games you have to collect the odd coin or two to help you on your travels while disposing of any nasty enemies that may cause your loss. OK, so it seems you in *Onan* may look like blob of white waddling up your ladders. The odd blob of two may get in its way in the action. The odd hidden character may show through the spikes and wires, but for all that the program is enjoyable to play.

The main objective is to find a little green handed man called *Wick* and dispose of him. Throughout your task you are helped by a robot in a hard hat well as some blue you with an extra life. To dispose of the robot you would use



magical sound and there it is with all your might. Having succeeded in this, you then catch your sword as it bounces back into your hands.

The features which attracted me to this particular game was that not all the screens were cluttered with platforms after platforms. The playing areas are quite barren on some screens. The joy and excitement in finding the correct paths to follow. To the end you are aided by a large flashing arrow showing you where you should be going. (Keeping them in the last) Some of the rooms you have to take an extra sword in their approach.

I cannot really say why, but for some reason this game had me going back to it time and time again. One point which many people may find disappointing is that each screen is loaded in sequentially from the disk. However, the load is a fairly quick load, so it should not detract too much from the overall enjoyment. P.E.

TOUCHLINE

Name: *Comet Computers* £5 *Gold Anniversary* £100 £75, *Milford Way, Milford, Southampton SO4 7AA. Tel: 029 256 3888. Price: £2.99. Machine: C64 disk. Operating: 512K. Playable: 512K. Graphics: VGA. Price for Users: £10.*

TRIVIAL PURSUIT

As you are of those people who is full of trivia information and needs to give it to others? This is the game for you.

Unless you've been living on a desert island for the last couple of years then you will probably have come across the board version of this computer game.



Personally, I prefer the computer version as it adds a few extra features to the board game. For a start a fatherly figure called TP does all the work for you including throwing a dart at the computerised board so that you don't have to roll a die. You also have the added dimension of sound and musical questions. (A point worth bearing in mind is that if you don't have any sound from your computer then you will not be able to hear any of the musical questions.)

Unfortunately, the music produced isn't all that clear and you have to know every word fully to it. I've read that with a little more effort the sound could have been improved drastically.

The playing area is set up exactly the same as the board game, but the screen shot. The idea is to move around the board answering the questions on the relevant subject. Your go continues until you fail to answer a question correctly. The large question at the end of the spiral can't win a wedge in the category's colour if you get the question correct. Once your piece is full then you look to the centre where the other players pick the subject for you. Answer this correctly and you win the game.

Provided with the game is an entire set of questions, this game can also be used on any computer that is running Power Partner and more sets will be available in a later date.

If you wish to speed up the game then you can make TP retards, in other words, prices again. This speeds up the game since TP normally 'spends' and the questions to you quite slowly, more fun off and they appear extremely quickly.

One extremely interesting feature of this game is the ability to have a break down of the questions that you have answered. This tells you which subject you favour, which ones you excel at and more to the point the ones that you haven't a clue about.

A time limit can be set in which the questions must be answered. The maximum time allowed is nine minutes as you don't have to wait until your Uncle Fred arrives in the depth of his brain to find something to read about in 1945.

What makes a great change for this type of trivia game is the fact that you don't have to be good at spelling and type the answers in as the computer spouts them. You simply have to tell everyone your answer, guess the five letters on the board, and the correct answer will appear so that you can compare.

One feature that is missing from the game is a SAVE GAME option. This would be extremely useful as games can go on for many hours and it isn't always possible to play through the night.

Some of you may spend a happy fortnight going around and round the board getting nowhere fast but it is great fun finding out what you don't know. Anyway it's far less weighty than outdoor pursuits. J.G.

TOUCHLINE

Name: *Trivial Pursuit Machine Ltd Price: £24.95*
Supplier: *Domark, 294 Purple Road, Wimbledon, London SW19 3PS. Tel: 01 877 5422*
Operating: *4/18. Playable: 8/18. Graphics: 8/18. Price: £18.*

CLEAN UP TIME

Everything is set for the grand opening of the new hotel in town. Unfortunately, the day before you let the public in, vandals break in and start scattering litter all over the place. As there are no employees present, the owner has no option but to hire two cowboy contract cleaners - Otto and Hobbes.

Armed with the promise of large amounts of money, they go in armed with balloons, guns (for shooting the indestructible vandals) and smelt bombs. Your objective is to sweep up the various bits of rubbish before the vandals can get them back. Succeed and it is on to the next one of eight different levels. There are also two bonus buckets to be collected on each level as well as a time related bonus.



Clean Up Time can be played as either a one- or two-player game. If you select the two-player option, then you can decide to play either as a team or competitors. As you score bonus points for killing the other person, it is not too difficult to see what score people will do, claiming that it was no accident. The problem with this is that at the start of each level, the two players come out of their respective rooms at the top of the screen, which just happens to be right next to each other so that one player can put a bullet in the other's back before he even blinks.

This is a simple game to play with not too much to recommend it but with nothing too bad about it either.

C B H

TOUCHLINE

Name: Clean Up Time Company: *Flappers, Monterey, Hawaii, California* Internal Exam, *Altavista, Santa Fe* Price: *\$29.95* Market: *USA* Graphics: *4/18* Graphics: *4/18* Playability: *3/10* Value: *4/18*

JACK THE NIPPER

Every kid and some grown-ups want to do a nifty and had thing and get away with it. This game lets you do just that.

As Jack, you are let loose upon an unsuspecting public and you cause havoc wherever you go. The more havoc you can create, the more your rating goes up.

The basic idea is that you go around the town and pick up objects that will catch you in your dirty hands. Having secured an object, you then have to decide in what way it can be best used. The object of the game ranges all your skills as a Demon the Mamma who play. Use an object in one place, and your Neighborhood will hardly budge, but used in the best place — up a pole.

Movement is by the standard left/right and fire button gear. To pick an object up — you may carry only two — you press the one or two key accordingly. (This is to say if you press the two key first, then the object you pick up is placed into pocket two. To use it, you press two again.) To go through a door, you press Enter.

Exploring the town can be quite funny, as usual I thought you have to avoid anything else that causes. Coming into contact with any moving object gets you squashed. After a certain number of squashings you loose out life.

The game presents some nice touches, with a couple of nice sound tracks. All in all a fairly novel, humorous and pleasant game.

P E

TOUCHLINE

Name: Jack the Nipper Company: *Granada Graphics, Alpha House, 28 Carter Street, Brighton B2 4PS, UK* Price: *£14.95* Price: *\$1.95* Market: *UK* Graphics: *3/10* Graphics: *4/18* Playability: *4/10* Value: *For Home: 3/10*



AFTERMATH

Error: like a good thief, 've up — and I'm no exception. The wireless branch up to you get killed and further into the battle. Unfortunately, *Aftermath* could not even get me slightly excited.

The main object of the game is to fight your way through more after waves of alien craft until you reach the enemy's stronghold. Having reached the far, our strategically placed bomb makes you the master.

I have to be honest though and admit that I did not get that far into the game. The basic reason being that I turned off my machine. The playing area consists of a continuously downward scrolling patch of ground, dotted with grey squares to represent the buildings of the enemy.

Having got past the first wave, you immediately get the second one and so on and so on. Unless you miss the slight pause between each wave, you would not know that you had successfully negotiated the previous one.

To add to all the excitement, you have a continuous flicker on screen where the alien craft occur, the *unwelcome* detours your attention from the job at hand.

I do not necessarily criticize a program in such a strong way (I always thank of the hard work and effort that the programmer puts in) but in my opinion, and please remember, this is only MY opinion, the game is a very poor *Black Hawk*.

C B H

TOUCHLINE

Name: Aftermath Company: *Alpha Design, C/O, P Kings 14, Cavendish Road, London E15* Price: *£19.95* Market: *UK* Graphics: *3/10* Playability: *2/10* Graphics: *3/10* Value: *4/10*

77

TWO ON TWO

A logical title for the occasion is *One on One, Two on Two* is a one or two player basketball simulation in which you play either singly or two men against the computer or as opponents with the computer controlling one player on each side.

Before you actually start playing, there are a huge number of options ranging from personal needs to choosing the abilities of your player (shooting and jumping skills, shooting accuracy etc). You can choose to play in a one off exhibition match or take place in a league.

The game itself is divided into four quarters. First one side attacks and then the other. Although you can steal the ball, you have to wait for the other part of the game to be drawn before proceeding so that there are no quick break-aways. Success in the game depends on your shooting and passing abilities. A quick pass to the player closest to the ball to your advantage or a kick that to do the same, you should a longer pass makes your man jump and you should aim to release the ball towards the basket right at the top of the hoop.

Your computer controlled team-mate plays a semi-intelligent sort of game, trying to find space and scoring opportunities as he sees fit, but he doesn't always do what you think he ought to. If this is really annoying you, you can start to call the plays and tell your man to patrol a specified zone on the court.

The animation of the players is well done although the rest of the graphics are nothing special. The main problem with the game is that basketball is very much a minority sport over here and with the game being fairly expensive and disk only, is likely to remain that way. For two late only

G.R.H.



Footnote

Name: Two on Two Basketball, Company: Activision, 23 Paul St, Weybridge, London TW20 2PN, Tel: 06 438 1181 Price: £14.95, Machine: C64, Originally: 3-W Graphics, 1-WB Playable, 1-WB, Value: 6/10



HOPELESS

Some people really get upset when they lose their girlfriends. One such person is Al 'Death Mask' Blaine. Al was just a plain, ordinary former contemporary sportsman and commander until the day that Miss Mink kidnapped his loved one. Miss M is the prettiest woman in town as the whole universe and he has taken the vengeful Jane to a part of the galaxy unknown to the rest of mankind - New Ayleon. Al decides to go and rescue her and so he packs a space shuttle in order to get himself to the outskirts of Miss's home world.

The first thing to worry about the game is that it is huge - a massive arcade adventure with platform game and strategy game set over 3000 screens. You only get some idea of how big it is when you log on to one of the terminals giving you access to a map of the area full of weird and wonderful structures to be explored. Corridor use of terminals is essential if you are to create your own body and there are 16 different skins for you to log on. There range from ordinary viewers to teleport systems. There are various two and four-way switches to be manipulated and top up stations for your strength, energy and fuel supplies. The most important though are the beam terminals. These open previously locked doors which allow access towards the base level where Miss has made a last nest for the unwilling Jane. There are 14 hearts to be discovered as well as some skills.

Al starts off in his space ship and his first problem is getting out. There are only three rooms but they are full of assorted mines and energy barriers to be overcome. Naturally, Al has taken the trouble to arm himself and has three different weapon systems available. The energy shield forms a barrier all round our straggled hero, killing all that it touches but it does require considerable amounts of - surprise, surprise - energy. Your laser is a more effective distance weapon but guzzles fuel. Finally, there is the good old futuristic Karate kick which again uses energy and can only be used when you are running. Personal damage reduces

strength but all three of these levels can be topped upon the appropriate terminal.

Once you have worked out how to escape from your capsule, it is necessary to switch into flying mode in order to explore the vast regions of space. All changing between transport and weapons modes is done by selecting the correct one via the function keys. A teleport terminal is a useful first one to find as it saves you both time and trouble as you fly through space. You cannot teleport directly into another building but there are many convenient platforms for you to land on. A word of warning. It is necessary to switch back into walking mode before you use a terminal. Remember to start flying again before you walk off the platform or else you will find yourself suspended before you can say Alpha Centauri.

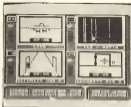
Hopalong is a highly original game and one that, unusual for a game on such a large scale, is both playable and addictive. Well worth keeping an eye open for.

G.R.H.

Switcher

From AlphaGraphics Company, Rindoraph/Stratcraft, 48 Long Ave, Carrot Garden, London W6.1. Tel: 01 445 4077. Price: Machine £145

Compatible: B/W Graphics, V/B Playability, B/W Value, B/W



HACKER II

After your success at breaking into the system in the original *Hacker*, the Government of the USA now looks on you as being some sort of specialist in the field. One day whilst quietly perusing the Activities Bulletin Board, your activities are interpreted by an on-screen message from the CIA. This invites you to go off in search of the Documentary Papers which are reported to be hidden in a secret laboratory. The contents of these papers if released, would send Western civilization as we know it

As might be expected, the papers are protected by a complex security screen and you will have to penetrate it if you want to get away with your mission. The deftless control of a myriad of items and gadgets and resources there, you have a device known as Multi-Function Switching Matrix. This is a combination of four various which can be used in its entirety or some of the 36-section. This is coupled with a video frame which you can scroll horizontally and then use the tapes to bypass a specific camera with your recording. This requires some considerable editing skills as everything has to be perfectly synchronised.

You also start off with three Mobile Remote Units which you will use to actually get the papers when you find them providing you can avoid the Assassinator - a little beast that the Russians can well open with the sole objective of destroying the MRUs.

The presentation of *Hacker II* is phenomenal and you can spend hours just playing with your machine, turning it on and off and switching from screen to screen. The instructions come in the form of an operating manual which is somewhat verbose and requires considerable study. There are considerable reservations about the game itself though. I suspect that it will be the sort of title that you show to your friends in order to demonstrate how clever you and the machine are, but will seldom go back and actually play.

G.R.H.

Switcher

From Hacker II Company, Avonmore, 21 Pond St, Hampstead, London NW3 2PN. Tel: 01 431 1292. Price: £899 on credit, £1499 cash. Machine £145

Compatible: B/W Graphics, B/W Playability, B/W Value, B/W

NOW GAMES 3

Collectors of games are all the more the wiser and *Now Games 3* follows in the style of *Now That's What I Call Mass pop records* - in other words, an assortment of last year's hot titles. These are five games included on the tape and they range from sporting simulations to strategy games to action adventures.

First off the list is *Nick Fields Plays the Open* which as you might guess, is a golf simulation. The course is the Royal St George's at Sandwich and you must meticulously govern the direction of your shot. The game is entirely screen driven and there are added features such as the quality questioning your choice if he thinks that you are wildly out on the club that you pick. Not a bad golf game but suffers in comparison to recent releases such as *Leaderboard* and *Golf Construction*.

Society is an arcade adventure in which you play a wizard trying to defeat the forces of evil. As you fly around the various locations, so you find objects which must be manipulated correctly in order to allow access to other areas of the game. Collaborate with monsters despite your energy and you must also complete your task of placing a specific item on the altar at Stonehenge before your time limit expires.

Cold Name War II sees you as Captain of Centurion II trying to protect the one up, much as follows of the Planet Venus. Your ship is equipped with various sensors, weapon systems and warp drives and you must decide how best to deploy your forces as you attempt to destroy the invading fleet of Mycon craft. An interesting mix of strategy, flight simulation and combat action.



The final program on side one of the tape is another arcade adventure - *Everybody's a Wally* starring Wally Wink and the rest of his family. Your objective is to collect the scattered parts of the code that let you in to the outside so you pay your wages. Different members of the family have different abilities and you need to swap between them as you explore the somewhat unusual town where they live. All this while avoiding tripping over the body and other assorted hazards.

There is only one game on side two but it is in three separate parts. *A View to a Kill* is an arcade adventure based on the James Bond film of the same name. Part one involves a car chase round Fern and is shown as a 3-D view together with a plan view of your surroundings. The second part sees you here and see fully armed attempt to escape from a burning building at San Francisco, collecting such useful items as a pocket computer or rifle. This is used in the final part in which James has to defeat the nuclear bomb hidden deep within a mine - another game. You can only enter parts 2 and 3 when you earn a code from part 1 but this shouldn't prove to be too difficult. A disappointing attempt at what could have been a very good game.

There is nothing outstanding in this package which makes you think that you ought to buy the tape straight away but none of the games are really bad either. Probably only worth considering if you don't already own any of the titles. If you have seen one or two before, then there are plenty of other collections to consider.

G.R.H.

Available

Acorn New Games 3 Company, Fights, 2nd Floor, York, Parkville Road, London NW4 2AN. Tel: 01 237 8879. Price £9.95. Machine C64.

Value £24.

PUB GAMES

Alternatively titled "A Drinking Man's Summer Games", *Pub Games* lets you keep your hand in when the Dog and Duck is closed or when the kids want what they have been missing before they are old enough to sample the delicious delights of the aforementioned barney. Seven different events are included for you to make a fool of yourself although, as if you do succeed in knocking over the black mahogany every time you step up to the bar behind the table, everyone will just assume that the landlord hasn't been watering the bar better quite so much as usual.

Darts is the most popular pub-game and is first to appear on the tape. Usual rules, straight in, double out. Your hand makes daily practice as you aim your arrow so it is not too easy to keep getting the high scores. The way around the table 20 also seems to have been accomplished considerably and unless your shot is dead on, your shot bounces to the floor off the wire. However, if you do manage to score a maximum, then there is a recognisable version of a classic "100".

Bar billiards is played over a set period of time with the objective being to get balls behind bushes which are being knocked over three strategically placed wooden mahogany. You must select the angle, power and spin of your shot. The table is roughly depicted as shown from where you would actually stand if you were playing and the only problem is a bit of dodgy bouncing when several balls collide at the top of the table.

Quintones is a well presented version of the game, the main problem being that you can see what your opponent is holding it, like an *ante* game. It is also easy to lose track of both ends of the chain if you are not careful so that you need to remember what items are on the table.

Table football is the best of three games with one ball per game. The computer spins which ever end the ball is nearest and all you have to do is move up and down on the rod to position your arm and move backwards and forwards to kick. Great fun this.



The two card games are a bit dull. *Pool* is a straight-forward buy, two and four version. You start off with £10 and play for 10 consecutive hands or until your money runs

out. The version of poker though would make the Cincinnati Reds in the process through. The bonuses don't increase and you get one chance to replace an ace, only if you want to attempt to improve your hand. There is no betting put to apart from an initial ante and money is paid out according to fixed odds on what hand you hold although there are wild below what they should be (not by a factor of thousands in some cases).

The final game is skittles. Two targets move across the screen at different speeds, the one at the front representing your hand and the one at the back being where you are aiming. Press the button and the ball travels in a straight line between the two, hopefully knocking down a few skittles on route.

Pub Games is not a bad collection of events. There are a few quirks such as player one sometimes using joystick one and sometimes joystick two which is a little confusing when you find all your parts (only points?) going to your opponent's total. Also, although you can practice at your own, you really need someone else to play against. Personally, I prefer the real thing, wretched pits and all.

G. R. H.

Touchline

Name: Pub Games Company, Alliance, 1 Orange St, Sheffield Post EP15 6JW. Machine: C&D
Developer: D&B Graphics, 119 Flaxley Rd, Hales
6/18



DEACTIVATORS

It's quite satisfying when a new style of game makes its head into the office. Deactivators is certainly one of these and offers every games player a challenge.

The Deactivators set is a control of an office complex and has been given the job of defusing a number of bombs that someone has kindly left lying around the complex.

Simple you might think, wander around the buildings find the bombs and get rid of them. Well, that's not so simple. Firstly you can't get all of the bombs out of the office block, some some of the transporters, at a very modern office, don't work. Plus there are of course the enemies out to stop you.

The game has five different office buildings of different complexity. You start off on a floor by floor building that is obviously very easy to find your way around. The doors that are given the job of clearing out this setup can only move around limited areas within the rooms. The playing area shows you the door that you are currently controlling and the rooms next door. The playing area is actually shown in 3D. The doors actually change in size as they move towards the back in front of the room which is an extremely nice touch.

Moving around and between the rooms is simply a matter of going through doorways, dropping through holes in floors, up and down fireman's poles and via carrier transporters.

The first level should really be treated as a practice one. The simple four by four layout gives you a taste of what is to come. As an example of the type of problem that you have to overcome consider the plight of the dead whose nearest transporters will not work and instead with only two rooms with a bomb to keep him company. One of the other doors must find a direct route that is unobstructed from the transporter controls, start it in its proper case so that the original door can get rid of a bomb. Simple isn't it?

Once you get on to the later levels the fun really starts. I forgot to tell you earlier that the office complex has been open to some experimentation in gravity. This means that some of the rooms actually oppose the normal effects of Newton's discovery. You may find that the floor has suddenly become the ceiling or the wall, unexpectedly become the floor. This can get you really confused when you are trying to control a door.

Usually only one door has access to the building's outer door where the bombs must be detonated. This means that you have a certain amount of overthinking between doors. For example one door may get hold of a bomb, be may then have to throw it through an open window, only to be caught by a door in the next room, who must then rush to the outside door and get rid of it. This is no problem on the first room but naturally presents further problems later on as the game.

As mentioned, the programmers have included some nice graphics effects, especially the 3D rendered carrier. However, carrier has been used very little in the game and tends to give you a feeling of emptiness as though nothing is happening. This however isn't the case as the game is fast and furious and doesn't leave you a second spare.

An excellent game which is refreshingly different. Even if it is a little difficult to play at first.

Touchline

Name: Deactivators Company, Alliance, 69 Long Ave, Court Garden, London WC2 Tel: 01 833 8461. Machine: C&D Post EP15
Developer: D&B Graphics, 119 Flaxley Rd, Hales
6/18

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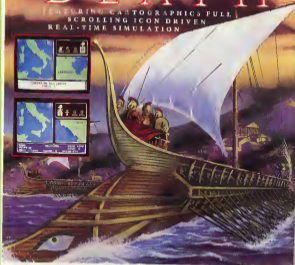
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Christmas Shopping

By Marie Curry

As expensive as always of your problems, we decided to bring you a special guide to what to buy the Commodore owner who has everything.

Christmas is a time of good cheer, parties, loving your neighbour and general high spirits. However it can also be a time of lots of brain-racking and headaches. Those awkward people who never seem to need after-dinner, both loose or M&S gift vouchers suddenly reappear at your life demanding presents on December 25. If these people also happen to own a Commodore computer then your problems could be solved by reading our buyer's guide. We've picked out lots of interesting and useful items to put every pocket.

Then again if you're a Commodore owner and you don't want yet another phony jumper from your early '80s, here Your Commodore goes at the page on the coffee table when the relatives come round and you never leave your host.

Under £20

Operation Agreement

Operation Agreement is an offspring of Operation Caretaker, released last year by Global. The version contains only the agreement to go and screw over the offending tape heads and in a smaller volume.

Company: Global Software
Address: PO Box 67, London SW11 1BS
Tel: 01 228 1360
Price: £1.95

Miscellaneous

If you think that your computer more lacks personality and looks dull in winter than perhaps the furry M&S-

knit from Digital Delusions could solve your problem. It's also aimed at making your mouse feel more comfortable in your hand. The rilly season has definitely arrived.

Company: Digital Delusions
Address: Lion 208, 32 Highbury Grove, London N5 2BE
Tel: 01 358 5840
Price: £6.95

Business Disks

Clear up Christmas day by giving business and buying business users disks for their stocking. Business Disks are removable and double-sided double density.

Company: Disking
Address: Poopoo, Liphook, Hants GU30 7BB
Tel: 0429 722562
Price: £9.95 per 10 pack. 50p p&p per pack.

ICFUG

The *Independent Commodore Products Users Group* has over 70 local clubs with regular meetings. It publishes a newsletter every two months containing 38 pages of news, reviews and information. ICFUG supports all Commodore machines from the PET to the Amiga.

Name: ICFUG
Address: Jack B Cohen, Membership Secretary, 70 Pennycuik Road, Newbury Park, Bland, Bore 103 1EP
Price: One year subscription £7K/£10

Dumping Fourway Sockets

For those who are fed up of being used a range of wires. The *Snatch* range

consists of two models the one fixed 4135 and the fixed 4136. Features include a socket on/off switch, a neon status indicator and a removable terminal cover for easy wiring.



Dumping Fourway Sockets

Company: Dumping Electronics
Address: Westwood Works, Margate Road, Broadstairs, Kent
Tel: 0853 62771
Price: around £30

Latin Spelling

A new design of joystick giving instant response to your movements. It's microswitch based and is designed to fit your hand not the table top giving comfort even during the longest game. It has a 12 month guarantee.

Company: Korte
Address: Unit 13, Salfrey Industrial Estate, Tredgore, Gwent NP23 4QZ
Tel: 048525 2611
Price: £12.99

Commodore £28 Reference Guide for Programmers

This book is published by Sams, the company which brought out *The Commodore 64 Reference Guide*. The first chapter covers elementary topics and later chapters concentrate on special programming applications. All operating systems are described in the

book plus hardware and software specifics and details of input and output features. There are also complete RAM and ROM maps with tips for memory management.

Company: Pitman Publishing
Address: 128 Long Ace, London WC2E 8AN
Price: £16.99 plus £1.70 p&p
ISBN: 0 617 2256 1

Trilogic's GT Leader

Essentially a fast loader, the cartridge has a reset button to protect the cartridge on start up. It works well with most of software and if there are any problems it reverts the program to the normal loading process.

Company: Trilogic
Address: 29 Holme Lane, Bradford BD4 6QA
Phone: 0174 604799 (with ext)

The Official CIB Programmers Reference Guide

The book contains 744 pages covering Basic 7, machine language, memory, saving files and machine language. Also included is information on casts, pointers, 88312, routines, constants etc. There is a CP/M machine and hardware schematics and electrical specifications.

Company: Level Ltd (Computer Publications)
Address: Ebbw Vale Distribution Ltd, Star Road, Penrhydyon Glass, Nv Hertsman, W Sussex RH13 5LD
Price: £16.90 plus £2 p&p

Script/Plus Cartridge

The Script/Plus Cartridge from Parsoft is for the C16 and Plus/4. It's a wordprocessor called Easyscript, already well known in its own right, with lots of extras also packed into the cartridge. Features include block move and paste search and replace, movable margins, End protect program and disk or cassette options. There's also a 150 page manual detailing all the features available.

Company: Parsoft
Address: 6 Park Terrace, Worcester Park, Surrey KT4 7LZ
Tel: 01 890 0811
Price: £18.95

Trojan Light Pen - Plus/4 and C16

The Trojan Light Pen allows you to write or draw free hand on the screen. There are five pen thicknesses including quills. The Pen Brush can use all 16 colours plus eight brightnesses to give 128 shades. Possible geometric shapes include circles, boxes, lines, triangles and bounding. Colour 16 is available in any way with any colour.

Company: Computer Copybond
Address: Freeport, London W5 1ER
Price: £18.95 inc p&p

Magik Disk Kit

Everyone who uses their disk drive the previous year on your software keeps your playing hand and can eventually knock it out of play. The Magik Disk Kit, supplied with a book of tips, can help remedy head alignment faults and help your machine's performance and also increase its life.

Company: Robert
Address: Unit 4, Newnham Business Complex, St John's Road, Newnham, Melton TW7 6NL
Tel: 01 847 6457
Price: £19.95

Super Diskette

Super Diskette is a Commodore 64 utility which enables you to protect your valuable data, store it on the bytes on your disk, interpret them to hex, ASCII or English, make changes and replace them. In the event of an accident Super Diskette can make the best possible repairs.

Company: Precision Software
Address: 6 Park Terrace, Worcester Park, Surrey KT4 7LZ
Tel: 01 330 1166
Price: £29.95

Trojan CAD-Master

The package includes a Trojan C16 light pen, a graphics software and an accessories booklet. Facilities available are: freehand draw, point brush, shape fill, geometric shapes, dynamic rubber banding and pen point functions.

Company: Microcomputer Software and Accessories

Address: Trojan Products, Dept Y Cars, 126 DeWaves Drive, Sarnia, Ontario S4G 7P9
Tel: 0793 200491
Price: £79.95 for package

Under £50

J-Cow

The J-Cow from Trilogic gives you 60 colours on your TV or monitor. It can convert RGB into RGB and is fully compatible with the C128. All 16 colours are available in both modes and an audio test is included in the price.

Company: Trilogic
Address: 29 Holme Lane, Bradford BD4 6QA
Tel: 0174 604799
Price: £27.95 inc VAT and p&p

Microstate Light Pen

A compact robust pen, no bigger than an ordinary ballpoint which connects to the joystick port of the C64. Included with the pen is a booklet and a software package. The pen is light, cheap and simple to use piece of hardware.

Company: Microsoft
Address: Powell Book Centre, Poole, Bristol BS11 1LQ
Price: £29.95

The Expert Cartridge

The Expert Cartridge from Trilogic is for the C64. It can store and run programs to disk, onto programs on one file, compare programs to reduce disk space used, store more programs faster and use RAM and disk based software for instant low cost updating.

Company: Trilogic
Address: 29 Holme Lane, Bradford BD4 6QA
Tel: 0174 604799
Price: £31.95 inc VAT and p&p

Pen Upgrade Boards

Courtesy of Supersoft you can now upgrade your PET. The ARM Pen boards allow any machine to be upgraded to a full 10K. The RAM Pen 16K will upgrade a 16K PET and the ARM PLUS 34 upgrades any large keyboard machines from 8K to 32K.

Company Supisoft

Address: Winchester House, Coombe
Road, Wokingham, Middle Hants RG1
Tel 01 361 1166
Price: *RAM Plus 16K* - £35, *RAM Plus*
32K - £50

The Final Cartridge

The *Final Cartridge* is an operating system built on a cartridge and is compatible with 90% of all programs. It includes a disk turbo, tape turbo, advanced commands interface, screen dump facilities, 24K extra RAM for Basic Basic 4.0 commands, Basic Toolkit, preprogrammed function keys, extended ML monitor, text search and freeze.

Company: H&P Computers

Address: 9 Haverham Walk, Wotton,
Essex CM8 2LZ
Tel: 0476 511471
Price: £45

Star88 Buster

Integracy Solutions' *Star88 Buster* is designed to combat the effects of main slowness on your computer. It directs activity from the keyboard, screen and operator. *Star88 Buster* consists of a scan item with two leads, each with a pick up head which attaches to a screen or keyboard. A third lead attaches to an earth point and the system picks up noise.

Company: Integracy Solutions

Address: 264 Manchester Road, Rochdale,
Lancs OL11 3HE
Tel: 0706 54715
Price: £49.95

Colour Two Colour Printer

The *Colour Two Colour Printer* is designed to be completely compatible with the Commodore range of computers. It uses roll paper which rolls the same as most office printers. There are a large number of materials available. All Commodore graphics characters can be printed and *Integracy* can also be printed out in lower cost mode. The ribbon is black and red so text can be highlighted.

Company: Citrus

Address: Nareson Merveller, 25 North
Row, London W1B 1DF
Tel: 01 611 6262
Price: £49.95

Under £100**Commodore Computer Courses**

Microcom UK has introduced home studies courses using your own Commodore. Courses are suitable for both children and adults who wish to gain a better understanding of their computer and computers in general. Subjects now available for the C64 are: *Introductory* and *Advanced Programming, Assembly Language, Graphics and Applications Software* and text is included with each course.

Company: Microcom UK

Address: 73 Princes Road, Chichester
CG1 4ED
Tel: 0206 275718

Value

C128 owners in need of an 80 column monitor may be interested in the Trilogy product. *Value 1* allows any TV or monitor to display the 80 column output of the 128 in any of the 80 available colours. The *Value 2* has the same function but cannot be used with a standard TV and the *Value 3* is a monochrome version of *Value 1*.

Company: Trilogy

Address: 29 Holme Lane, Bradford
BD4 6QJ
Tel: 0274 849626
Prices: *Value 1* £89.95, *Value 2*
£49.95, *Value 3* £29.95

Open Organiser Desk

The *Open Organiser Desk* is designed to help you sort out your computer system. There is shelving to accommodate your monitor, printer, computer, disk drive, cassette recorder and software and the desk finished and installed with others to make a fully mobile. Assembled dimensions are height 31", width 48", and depth 28".

Company: Open Supplies

Address: 55 Goswold Way, Holme-
house Estate, Bradford, Surrey
Tel: 0777 66680
Price: £59.95 (inc. VAT and delivery)

Computer Weekend Books

Cheap and educational these weekenders will allow you to get away from it all and expand your computing knowledge at the same time. Hosted by Andrew Adams and Chris Hinch

these are weekends specially designed for Commodore users of all ability levels.

Company: Andrew Adams

Address: 21 Keston Place, London
W1
Tel: 01 609 4461
Price: about £60

Keypad Mouse

The *Keypad Mouse* (available for the C64 and C128) uses an optical system to detect movements of an internal tracker ball and is precisely mounted to the interface using a simple post rod. The feature means the joystick can be easily repositioned into gaming or future graphics or business packages.

Company: Keyputer

Address: Unit 4, Weston Lane,
Bedford MK41 7HUY
Tel: 0234 327554
Price: £69.95

 Voyager 7 Modem

The *Voyager* range of modems has full BART approval. It's multi speed including 1200/960, 1200/75, 75/1200 full duplex and 1200/1200 full duplex, LED and computer status messages and (according to Modem House) more software than any other modem.

Company: Modem House

Address: 70 Longbrook Street, Duxley,
Droghda DU4 6AP
Tel: 0902 214255
Price: £81.99 (inc. VAT)

As an extra with this product you can buy the *Adventure 32 Cartridge* which provides automatic, auto answer and fallback support. It's available from Modem House and costs £49.95.

£100 plus**44 Multitasker**

This modem gives you diallines, bulletin boards, electronic mail and Protocol on your Commodore-64 or 128. Features include attached and networked, online software on board in ROM. It's status driven and multiplexed with CCITT 821/23 and full 107 standards, baud rates 960/960, 1200/75 and 75/1200.

Company: Miracle Technology
Address: St Peter's Street, Ipswich IP1 1XB
Tel: 0457 216144
Fax: 0146 15 (inc VAT and p&p)

Red Boxes



Red Boxes is a new way in which your computer can help run your life. They are programmed, using your C64 or C128, to send signals along the main wiring of a domestic house to control lighting, heating and other appliances powered by a diming socket. They can also receive and react to signals from devices such as infrared detectors, smoke detectors and temperature gauges. The Red Box Starter-Start consists of three units: Red Leader, Red One and Red Two.

Company: General Information Systems
Address: 1 White Hart Yard, London SE11 1NX
Price: £129 (inc. p&p)

Enhancer 2000

The Enhancer 2000 disk drive is Commodore compatible and offers high speed compared to Commodore's own drives. It comes with a one year warranty and is suitable for double density 5 $\frac{1}{4}$ " 1.8 track drives. It has a direct access spindle motor and uses no computer memory. Bundled free with the disk drive is master word software drives word processor worth £50.

Company: Precision Software
Address: 206 Green North Road, Epsom Surrey, St Neots, Cambs PE19 1EP
Price: £227.50 inc VAT and p&p (£2 extra for one day express mail)

Spiky-1 Cartridge System

This user-friendly system allows you to store programmes, files and machine code programmes in a cartridge. A special access system is included which can clear the cartridge for reuse. The

system pack includes cartridge programmer, cartridge eraser, user-friendly operating system and an erasable cartridge.

Company: Reed Instruments
Address: 11 Southfields Court, Sutton Common Road, Sutton, Surrey SM1 3JZ
Tel: 01 544 0981
Price: £144.95 inc VAT and p&p

WS600 Modem

The WS6000 from Miracle Technology is fully interfaced and speed buffered and offers automatic and automatic as well as Hayes type compatibility. In standard version the WS6000 supports the CCITT V21 and V22 standards offering speeds of 300, 600, 1200, 1200/75 and 2400/1200. Optional upgrades include V22 1200 baud full duplex and V22bis 2400 baud full duplex plus option of GEMF error checking, battery backed internal telephone directory, process control port and BELL standards for transmission communications.

Company: Miracle Technology
Address: St Peter's St, Ipswich IP1 1XB
Tel: 0473 216144
Price: £248.95

Star Printers

Two star printers have been reduced in price and are now much more accessible to home users on a low budget. They are the Hope Passport laser wheel printer and the Hope 60-80 thermal printer.

Company: Star Microsics
Address: Crown House, 40 Underley Road, Ealing, London W5 2BS
Tel: 01 540 1500
Price: Pass-Porter £126, 60-80 £76

Commodore's Collection

Following last year's special Commodore computer pack, Commodore is attacking the year's Christmas market with a collection of products based around the new 64C computer, a re-styled version of the standard Commodore 64.

The Commodore pack comes complete with a 64C computer, cassette version of the well known board game Manyaq, Scramble Chase, Chess and Emulators. For those of you who are interested in typing, the

official Primex typing course is included and for graphics freaks a mouse and professional business word-processed notes.

So that you can see the pack in action you get it from a Commodore master recorder it also provided.

Company: Commodore UK
Address: 5 Havers Road, Wilton, Cuckoo, Northants NN17 1JX
Tel: 0756 285212
Price: £249.99



Commodore C128

For those of you who are more interested in putting your computer to work than playing games all of the time, the Commodore 128 computer is definitely well worth looking at.

The Commodore 128 computer comes complete with a built in double density disk drive, ideal for running business packages. The computer maintains compatibility with the Commodore 64 computer and just about all 64 software will work on the C128 without any problems.

The Basic has been expanded from the C64 version of the language making it an ideal machine for someone who is interested in writing their own programs.

If you are interested in using the machine for business then you will be pleased to learn that this computer is compatible with CP/M. A system that has been running on business machines for a number of years. This means that a large number of business programs are already available for this machine, including the ever popular Wordstar wordprocessing program. If

Company: Commodore UK
Address: Commodore Business Machines Ltd, 5 Havers Road, Cuckoo, Northampton NN17 1JX
Tel: 0756 285212
Price: £249

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On-Going News Situation: US

America, birthplace of Commodore machines, is still fertile ground for new ideas. Our Stateside correspondent brings you the latest from over there.

By Lewis Tilley

Party was everybody! Party time!

This is the familiar cry during the holiday season in the States. From the business rooms to a school playground to the weak performance officers of the advertising agencies at the big stores, this invitation to fun and games is heard. This column is devoted to helping you have the best of all times in this season. A full page advertisement is a favourite Commodore magazine gets us off to the right start with a bright and honest CELEBRATE EVERY OCCASION WITH YOUR COMPUTER! made. The ad promises "you're so able just how much fun your computer can be!" and invites you to a party software for with Commodore (89.95), Amiga (94.95), Atari (99.95) and to help us forget (84.95). The last "party" annual product doesn't actually include software but supplies you with all the colorfully designed paper envelopes, stickers, notices, disk labels and notes as to which you post the other disks. They are all offered by Hi-Tech Expansions Inc. What fun! Penetration alright!

Now that you have an invitation to a party in the US, it's time to look at the culture. Just as in some of the different versions of American football to which you was introduced in the first line notice:

World's Greatest Football by Epps has exciting playing fields and tricky scoring and uses just one 3.5" Epps also does World's Greatest Baseball which isn't quite up to the standard of the football game.

On Field Football, 129.95 by Gammat, certainly goes even to a team and might get complete fans confused about the real game. Gammat's Ge-

omet Tennis also 129.95 seems to give a more realistic version of this game with 10, shutdown, footlocking and good graphics contents.

Super Bow! Soccer (93) from the Avon Hill Game Company, is a total control simulation which runs the two football conferences, AFL/NFL, in games based on statistics of Super Bowls in the past. This game is been called "the outstanding statistical replay football program in the computer field".

There has been an Expansion Disk 1 previously issued which covered the 1984-85 National Football League season. For this Christmas we have the Expansion Disk 2 which dips into the past for more super teams. Would you believe Detroit-Cleveland 1987? I can hardly remember it. The expansion disks are only 129 each.

Had enough American football? Epps follows Soccer Games 1 and 2 and Hockey Games with World Games. You travel around the globe to compete in eight different events. Or with another Epps title you can still stay in one squared circle and woods all by yourself or with a friend and/or your parents in Championship Wrestling there are 20 holds plus overhead grappling. For fans there is also the new Super Cycle from Epps.

Leader Board has been one of the outstanding computer sports simulations for the American market (and now it has also met with success in the UK). It is the usual end the ring which makes the golf game so satisfying. One hole that this, have actually played a club like a master.

Leader Board's publisher Avon software has it using Hit Frame, "the professional bowling simulator" by the same authors. Brass and Bgr-

Carver, for the Christmas trade. Both of these games cost a whopping 129.95 here in the US. I bought my Leader Board on a long-anticipated magazine sale in Italy for 11 Lira (about \$16). Of course that was the older 1980 for the light, you can't see.

A recent customization by Epps of the version of JMF Roller Skater was modified on one that was done in London at the time of the last association. The boardgame adaptation of the same name doesn't give you the feeling of being with Holmes in his own digs but it does challenge you with 30 cases of the old Smith in Victorian London. Thirty more cases are being prepared for future issue by Intellectuals' Details.

Electronic Arts is trying something new with Scavenger Hunt. It is an attempt to provide the whole family in computer games. Non-computer Hunt uses a 24" gameboard and a pack of cards. There's also another package called Murder Party which requires computers, often and differently computed answers for every party size.

I can't let you have any party without inviting you to another one so I've saved the space one till last. Leader Goldwyn of Phobos (formerly to be available in the UK. I am informed) is from Belgium and I assure leather clad women who want to turn into a cat some for themselves. Cheap thanks from a computer's author database sales plus, I'm invited to believe.

To conclude I think that I've included something for everyone in every sense so all that remains is to wish you a Merry Christmas and a Happy New Year.

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You may have noticed that our listings are free of those horrible kite-like black dashes which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the fancy numbers by the side of each line of the listing. For no other, it's all part of our easy entry and

instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their message.

For example, [SA] would mean type one Shifted A, or an line of spaces in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realize that [C+] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then that will be printed as [SPC4] or, alternatively, [SSPC4] translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters would appear as [CTRL N DOWNLEFTBLUE, F1,C3].

This would be achieved by holding

down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F1 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print as follows).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS] [C+]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by rotating the line up to the message. Then type a closing quotation mark (SHIFT Q + 2) and delete it. This gets the computer out of quotescode. It is hold down CTRL and press the number zero key (N/0/PC), type the relevant number of inverted T's and then hold down CTRL and press zero (N/0/PC). Next type another quotation mark and delete it again. Note Graph the line and press RETURN.

A lot of these special codes is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string, the symbol for pi. This may appear when a value is needed in a calculation so this may look something like

CC=C*(PI)*E

(press the square brackets and just type in a shifted opened pointing arrow (at the pi symbol)

PROGRAM: TROUBLESHOOTING

```

100 PRINT "TROUBLESHOOTING - HELP"
200 PRINT "1. POWER SUPPLY - Check power
300 PRINT "2. CABLES - Check cables
400 PRINT "3. MEMORY - Check memory
500 PRINT "4. DISPLAY - Check display
600 PRINT "5. SOUND - Check sound
700 PRINT "6. STORAGE - Check storage
800 PRINT "7. NETWORK - Check network
900 PRINT "8. OTHER - Check other
1000 PRINT "9. HELP - Check help
1100 PRINT "10. END - Check end
1200 PRINT "11. START - Check start
1300 PRINT "12. STOP - Check stop
1400 PRINT "13. PAUSE - Check pause
1500 PRINT "14. CLEAR - Check clear
1600 PRINT "15. PRINT - Check print
1700 PRINT "16. LIST - Check list
1800 PRINT "17. LOAD - Check load
1900 PRINT "18. SAVE - Check save
2000 PRINT "19. DELETE - Check delete
2100 PRINT "20. COPY - Check copy
2200 PRINT "21. PASTE - Check paste
2300 PRINT "22. MOVE - Check move
2400 PRINT "23. FIND - Check find
2500 PRINT "24. GOTO - Check goto
2600 PRINT "25. RETURN - Check return
2700 PRINT "26. ESCAPE - Check escape
2800 PRINT "27. HELP - Check help
2900 PRINT "28. END - Check end
3000 PRINT "29. START - Check start
3100 PRINT "30. STOP - Check stop
3200 PRINT "31. PAUSE - Check pause
3300 PRINT "32. CLEAR - Check clear
3400 PRINT "33. PRINT - Check print
3500 PRINT "34. LIST - Check list
3600 PRINT "35. LOAD - Check load
3700 PRINT "36. SAVE - Check save
3800 PRINT "37. DELETE - Check delete
3900 PRINT "38. COPY - Check copy
4000 PRINT "39. PASTE - Check paste
4100 PRINT "40. MOVE - Check move
4200 PRINT "41. FIND - Check find
4300 PRINT "42. GOTO - Check goto
4400 PRINT "43. RETURN - Check return
4500 PRINT "44. ESCAPE - Check escape
4600 PRINT "45. HELP - Check help
4700 PRINT "46. END - Check end
4800 PRINT "47. START - Check start
4900 PRINT "48. STOP - Check stop
5000 PRINT "49. PAUSE - Check pause
5100 PRINT "50. CLEAR - Check clear
5200 PRINT "51. PRINT - Check print
5300 PRINT "52. LIST - Check list
5400 PRINT "53. LOAD - Check load
5500 PRINT "54. SAVE - Check save
5600 PRINT "55. DELETE - Check delete
5700 PRINT "56. COPY - Check copy
5800 PRINT "57. PASTE - Check paste
5900 PRINT "58. MOVE - Check move
6000 PRINT "59. FIND - Check find
6100 PRINT "60. GOTO - Check goto
6200 PRINT "61. RETURN - Check return
6300 PRINT "62. ESCAPE - Check escape
6400 PRINT "63. HELP - Check help
6500 PRINT "64. END - Check end
6600 PRINT "65. START - Check start
6700 PRINT "66. STOP - Check stop
6800 PRINT "67. PAUSE - Check pause
6900 PRINT "68. CLEAR - Check clear
7000 PRINT "69. PRINT - Check print
7100 PRINT "70. LIST - Check list
7200 PRINT "71. LOAD - Check load
7300 PRINT "72. SAVE - Check save
7400 PRINT "73. DELETE - Check delete
7500 PRINT "74. COPY - Check copy
7600 PRINT "75. PASTE - Check paste
7700 PRINT "76. MOVE - Check move
7800 PRINT "77. FIND - Check find
7900 PRINT "78. GOTO - Check goto
8000 PRINT "79. RETURN - Check return
8100 PRINT "80. ESCAPE - Check escape
8200 PRINT "81. HELP - Check help
8300 PRINT "82. END - Check end
8400 PRINT "83. START - Check start
8500 PRINT "84. STOP - Check stop
8600 PRINT "85. PAUSE - Check pause
8700 PRINT "86. CLEAR - Check clear
8800 PRINT "87. PRINT - Check print
8900 PRINT "88. LIST - Check list
9000 PRINT "89. LOAD - Check load
9100 PRINT "90. SAVE - Check save
9200 PRINT "91. DELETE - Check delete
9300 PRINT "92. COPY - Check copy
9400 PRINT "93. PASTE - Check paste
9500 PRINT "94. MOVE - Check move
9600 PRINT "95. FIND - Check find
9700 PRINT "96. GOTO - Check goto
9800 PRINT "97. RETURN - Check return
9900 PRINT "98. ESCAPE - Check escape
10000 PRINT "99. HELP - Check help
10100 PRINT "100. END - Check end

```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line-checking program.

Type in the Checksum Program, note well that you've not made any mistakes and save it to tape or disk

immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type on a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

















If the two values don't match one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

















press RETURN again.

If you want to turn off the checker simply type SYS49133 and the screen will return to the familiar blue colour. You can then do whatever it was you wanted to do and if the doom case the man whose Checksum has you can go back to it with the same SYS command.

No system is foolproof but the chance of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing!

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Macrocode	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		F1 key
[F2]		SHIFT & F1 key
[F3]		F3 key
[F4]		SHIFT & F3 key
[F5]		F5 key
[F6]		SHIFT & F5 key
[F7]		F7 key
[F8]		SHIFT & F7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RYSUM]		CTRL & 9
[RYSOFF]		CTRL & 0

Macrocode	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[FOUNDED]		↓
[LARGER]		←
[UPARROW]		↑
[F9]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Clear]		CRM + letter
[Water]		SHIFT + letter

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It's three o'clock in the morning. You sit at the computer keyboard you furnished a marathon typing session entering one of the many programs from Your Computer Your Choice ready for the keyboard and press the letters B, U and M. You press RETURN, at last, and nothing happens.

Everyone has probably faced this problem. What it does happen it's a matter of spending hours wading through the program for one typing mistake. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The Your Computer Software Service can let a reliable all of the programs from each issue on both a cassette and disk at a price of \$8.95 for disk and \$4.95 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazines. Should you not have the magazine then book orders are available from the following address:

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The Cassette

All programs on the cassette are saved using a turbo program. If you have ever purchased software from us on cassette before it was worth pointing out that as of the new cassette the turbo used has been altered. On all cassettes for previous issues the programs are compressed and appear in the same format as they do in the magazines, i.e. in the form of Basic loader. The new turbo being used from this issue onwards allows us to produce fully working versions of the program on cassette. This means that you will simply be able to LOAD the programs in and they will automatically start. Should we put any programs for the C128 on the cassette they will be saved as C64 programs. LOAD these programs into the computer in C64 format and run as there is cassette or disk. To use the program turn your computer into C128 mode and LOAD and RUN as normal.

The Disk

Programs on the disk will also be supplied in totally working versions, i.e. when possible we will not use Basic Loaders than the tape used for the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassette. However programs for these machines will be available on the disk.

What programs are available?

At the top of each issue you will find a stamp containing the article type, C64 Program etc. So that you can see which programs are available in a whole format you will also find a couple of symbols after this stamp. The symbols have the following meaning:



This symbol means that the program is available on cassette



These programs are available on disk

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that requires to be loaded from disk on to tape. 71

UTILITY SPECIAL

This contains a few of our most popular utilities from earlier issues of the magazine. The programs are MACH32 our disk based assembler from Nov '85 to Feb '86 STOP EDITOR — add protection to your programs with the ability from our Feb '86 issue.

IN CHARACTER — an excellent character editor from November 1985
MOB MAKER — to complement the character editor, a special editor from the March 1985 issue
DISK EDITOR — An extremely powerful utility for disk drive owners, allowing you to directly format and also view segments of your disk.

Should you not have one of the above issues and wish like instructions than a full set of photos copies is available for £1.50. Please order this separately from Your Computer, Unity Special Photocopies, No 1 Golden Square, London W1R 3AD. Cheques or Postal orders to be made payable to A.S.P. Ltd.

ORDER CODE
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 TAPE — YCMANR2 £4.00

NOVEMBER 1986

Into The Eighties — now you can give your C64 80-column capability, with this program. You have access to two screens either the 40 column version or the new 80 column one.

C64 SOUND SAMPLER — now your C16 or Plus/4 can sound like any instrument you like with thousands samples. Available on disk only.

C64 AUTOSAVE — You've been programming for hours and your computer crashes taking all of your work with it. Well, you can prevent this with our C64 Autosave. This will save your programs to disk at approximately five minutes automatically so you won't have too much work to catch up on.

BATAMAKER 128 & C64 — Two excellent database management one for the C128 and one for the C64.

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 DISK YDNOR16 £4.00
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APRIL 1986

TELEPHONE EXCHANGE — Our excellent telephone communications program for use with a C64 and RS232 modem.

SPRITES — Give your imagination of sprites with this utility. Includes sprite animation, collision detection, sprite design etc. (C64).

DATA BOOK — Keep track of your information with this database program for the C128.

BASIC TEST SYSTEM — A useful utility for debugging programs. Commands include TRACE, SINGLE STEP and the ability to set break points (C64).

TAPMON — A superb machine code monitor with 19 commands including (Hex) to Hex conversion, disk access, memory, disassembly etc. (C64).

FOR THE 128 — Set up extended files on your C128 disk drive. Plus, a program that will assemble a program in C64 mode (128).

ORDER CODE
 DISK YDAPR24 £6.00
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MAY 1986

ADVENTURE AID — A set of routines to help you write your adventures. Includes facilities for setting up location

descriptions, vocabulary etc. (C64).

TELEPHONE EXCHANGE — (See April 1986)

3D ROUTINES — Routines to allow you to produce effects similar to those found in the famous 3D master type game (C64).

WORDPROK — A powerful disk based wordprocessor for use with the C64. Includes commands for line spacing, setting margins, performing word counts etc.

POLAR PEEK — Can you help Peter build his glider in this game for the C64?

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JUNE 1986

DATABASE 64 — A superb database program for 64 owners. For use with tape or disk.

TAPE 128/64 — Produce a portable records with your C64 and your 1232 printer/plotter.

LOW RES UTILITY — Flaming cartoon for use with your C64 and no low-res graphics. Includes dots, lines fill etc.

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BUDGET 64 — Keep track of your finances with this C64 program. Up to 20 different budgets can be set up without each bank account.

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JULY 1986

DATABASE 128 — Keep track of your data with this utility for the C128.

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DIAL A FILE — File downloaded with our TELEPHONE EXCHANGE program can now be edited with the extension for the C64.

ASSEMBLER 128 — A full blown assembler for use with your C128 and tape or disk.

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Remember the Plus/4

Joe Bradley provides some more utilities for your Plus/4.

If you feel that your programming skills are coming along fairly well, then this article should be of interest to you. I propose giving three major utilities all to be used via the device mode.

(a) A FIND system which will be of use in developing Basic programs. FIND will search for all Basic files containing all, ready for you to delete or change.

(b) A MERGE routine for disk use which will merge all or part of a program on the disk with a program in memory. The routine is a drive merge in that you select the start and end of a program on disk and merge it with a program already in the Plus/4 memory — not add it on the end as is the case with many Merge programs.

(c) An assembler for the Plus/4 which would support all labels etc and enable you to write machine code programs in assembler language.

Starting Up

The program in its completed state is loaded from disk or tape into the normal Basic mode. The first task is to Basic which operates routines to move the utilities into memory starting at 2000, leaves the top of memory to print the routines and leaves a swap in the C64 CHR routine so that new Basic commands FIND, MERGE and ASSEMBLE are accepted.

First type in the Basic program in Figure 1. The 800 4528 will operate the routines which maintain the program, the screen is cleared and a heading printed so that you know the program is ready for use. DO NOT RUN this program before typing in the substitution program which is given in Figure 2.

FIG. 1 INITIAL PROGRAM

```

10 PRINT"CLEAN":GOTO4500
20 PRINT"SPCH"*****
30 PRINT"SPCH" PLUS/4 SUPPORT SYSTEMS **
40 PRINT"SPCH"*****
50 PRINT"PRINT
60 PRINT"SPCH"ASSEMBLE"
70 PRINT
80 PRINT"SPCH"FINP"
90 PRINT
100 PRINT"SPCH"MERGE"*****"PRG NAME"*****"SA"
    START-FINISH"
110 NEW
  
```

I have decided that the best way to enter machine code is to use the monitor. The reason most programs are written in data statements is that the C64 does not have a monitor. To

type M(\$start,\$end) and (RETURN) to go into monitor, then M (\$start, (RETURN) will display the first block of memory. Change the memory locations to read as in Figure 2. At the

FIG. 2 INITIALIZATION

11000 00 00 00 00 00 00 00	11000 00 00 00 00 00 00 00
11001 00 00 00 00 00 00 00	11001 00 00 00 00 00 00 00
11002 00 00 00 00 00 00 00	11002 00 00 00 00 00 00 00
11003 00 00 00 00 00 00 00	11003 00 00 00 00 00 00 00
11004 00 00 00 00 00 00 00	11004 00 00 00 00 00 00 00
11005 00 00 00 00 00 00 00	11005 00 00 00 00 00 00 00
11006 00 00 00 00 00 00 00	11006 00 00 00 00 00 00 00
11007 00 00 00 00 00 00 00	11007 00 00 00 00 00 00 00
11008 00 00 00 00 00 00 00	11008 00 00 00 00 00 00 00
11009 00 00 00 00 00 00 00	11009 00 00 00 00 00 00 00
11010 00 00 00 00 00 00 00	11010 00 00 00 00 00 00 00
11011 00 00 00 00 00 00 00	11011 00 00 00 00 00 00 00
11012 00 00 00 00 00 00 00	11012 00 00 00 00 00 00 00
11013 00 00 00 00 00 00 00	11013 00 00 00 00 00 00 00
11014 00 00 00 00 00 00 00	11014 00 00 00 00 00 00 00
11015 00 00 00 00 00 00 00	11015 00 00 00 00 00 00 00
11016 00 00 00 00 00 00 00	11016 00 00 00 00 00 00 00
11017 00 00 00 00 00 00 00	11017 00 00 00 00 00 00 00
11018 00 00 00 00 00 00 00	11018 00 00 00 00 00 00 00
11019 00 00 00 00 00 00 00	11019 00 00 00 00 00 00 00
11020 00 00 00 00 00 00 00	11020 00 00 00 00 00 00 00
11021 00 00 00 00 00 00 00	11021 00 00 00 00 00 00 00
11022 00 00 00 00 00 00 00	11022 00 00 00 00 00 00 00
11023 00 00 00 00 00 00 00	11023 00 00 00 00 00 00 00
11024 00 00 00 00 00 00 00	11024 00 00 00 00 00 00 00
11025 00 00 00 00 00 00 00	11025 00 00 00 00 00 00 00
11026 00 00 00 00 00 00 00	11026 00 00 00 00 00 00 00
11027 00 00 00 00 00 00 00	11027 00 00 00 00 00 00 00
11028 00 00 00 00 00 00 00	11028 00 00 00 00 00 00 00
11029 00 00 00 00 00 00 00	11029 00 00 00 00 00 00 00
11030 00 00 00 00 00 00 00	11030 00 00 00 00 00 00 00

end of the first block. M (RETURN) will display the next block of memory ready for you to change.

Have you done it all yet? This is always a scary first experience! Check the Plan-4 you can disassemble the routine using the monitor.

Type D #180 (BCP (RETURN)) to disassemble the routine and it should be as Figure 3. If not, check for errors and adjust.

This may be a bit for you with 600 on your firm console, so I shall now look

at the basic routine which you will need to use at this point. We want to save the Basic program and the machine code routines, at the same time, so while you are still in the monitor type

\$PUTLISTS "J,1000,1A00" for tape or
\$PUTLISTS "J,1000,1A00" for disk

At the next session you will be able to load and save with personal Basic commands provided you do not alter

the usual Basic program at the start.

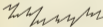
You can run the program to check what happens so far. You should see the loading appear and the screen flashing to show that it is ready for your next command. Your new routines are not in yet, so if you type \$END (RETURN) the computer will probably hang. Don't do this just yet, although you can save and reload your program. However if you look at the top of memory pointers \$V, \$W you will see the top of memory has been

FIGURE 3

1110	99	4C	LDR	#44C					
1111	1D	7D	04	STR	#047D				
1112	89	43	LDR	#843					
1113	7D	7E	14	STR	#047E				
1114	4F	7E	LDR	#7E1					
1115	4D	7F	04	STR	#047F				
1116	8F	EC	LDR	#8EC					
1117	8F	04	STR	#04					
1118	8F	FF	LDR	#8FF					
1119	8F	05	STR	#05					
1120	7D	14	STR	#14					
1121	8F	01	LDR	#801					
1122	8F	11	LDR	#811					
1123	8F	15	STR	#15					
1124	8F	14	LDR	#14	Y				
1125	8F	07	STR	#07	Y				
1126	0F		JNV						
1127	10	F7	BNE	#110F					
1128	06	04	JNC	#04					
1129	06	15	JNC	#15					
1130	8F	15	LDR	#15					
1131	C9	29	LDR	#129					
1132	8F	0C	BCD	#10C					
1133	8F	04	BCD	#104					
1134	8F	09	LDR	#09					
1135	8F	03	LDR	#03					
1136	8F	02	LDR	#02					
1137	8F	01	LDR	#01					
1138	8F	07	STR	#07					
1139	8F	08	STR	#08					
1140	8F	0D	LDR	#0D					
1141	8F	0E	STR	#0E					
1142	8F	0F	STR	#0F					
1143	8F	10	STR	#10					
1144	8F	11	STR	#11					
1145	8F	12	STR	#12					
1146	8F	13	STR	#13					
1147	8F	14	STR	#14					
1148	8F	15	STR	#15					
1149	8F	16	STR	#16					
1150	8F	17	STR	#17					
1151	8F	18	STR	#18					
1152	8F	19	STR	#19					
1153	8F	1A	STR	#1A					
1154	8F	1B	STR	#1B					
1155	8F	1C	STR	#1C					
1156	8F	1D	STR	#1D					
1157	8F	1E	STR	#1E					
1158	8F	1F	STR	#1F					
1159	8F	20	STR	#20					
1160	8F	21	STR	#21					
1161	8F	22	STR	#22					
1162	8F	23	STR	#23					
1163	8F	24	STR	#24					
1164	8F	25	STR	#25					
1165	8F	26	STR	#26					
1166	8F	27	STR	#27					
1167	8F	28	STR	#28					
1168	8F	29	STR	#29					
1169	8F	2A	STR	#2A					
1170	8F	2B	STR	#2B					
1171	8F	2C	STR	#2C					
1172	8F	2D	STR	#2D					
1173	8F	2E	STR	#2E					
1174	8F	2F	STR	#2F					
1175	8F	30	STR	#30					
1176	8F	31	STR	#31					
1177	8F	32	STR	#32					
1178	8F	33	STR	#33					
1179	8F	34	STR	#34					
1180	8F	35	STR	#35					
1181	8F	36	STR	#36					
1182	8F	37	STR	#37					
1183	8F	38	STR	#38					
1184	8F	39	STR	#39					
1185	8F	3A	STR	#3A					
1186	8F	3B	STR	#3B					
1187	8F	3C	STR	#3C					
1188	8F	3D	STR	#3D					
1189	8F	3E	STR	#3E					
1190	8F	3F	STR	#3F					
1191	8F	40	STR	#40					
1192	8F	41	STR	#41					
1193	8F	42	STR	#42					
1194	8F	43	STR	#43					
1195	8F	44	STR	#44					
1196	8F	45	STR	#45					
1197	8F	46	STR	#46					
1198	8F	47	STR	#47					
1199	8F	48	STR	#48					
1200	8F	49	STR	#49					
1201	8F	4A	STR	#4A					
1202	8F	4B	STR	#4B					
1203	8F	4C	STR	#4C					
1204	8F	4D	STR	#4D					
1205	8F	4E	STR	#4E					
1206	8F	4F	STR	#4F					
1207	8F	50	STR	#50					
1208	8F	51	STR	#51					
1209	8F	52	STR	#52					
1210	8F	53	STR	#53					
1211	8F	54	STR	#54					
1212	8F	55	STR	#55					
1213	8F	56	STR	#56					
1214	8F	57	STR	#57					
1215	8F	58	STR	#58					
1216	8F	59	STR	#59					
1217	8F	5A	STR	#5A					
1218	8F	5B	STR	#5B					
1219	8F	5C	STR	#5C					
1220	8F	5D	STR	#5D					
1221	8F	5E	STR	#5E					
1222	8F	5F	STR	#5F					
1223	8F	60	STR	#60					
1224	8F	61	STR	#61					
1225	8F	62	STR	#62					
1226	8F	63	STR	#63					
1227	8F	64	STR	#64					
1228	8F	65	STR	#65					
1229	8F	66	STR	#66					
1230	8F	67	STR	#67					
1231	8F	68	STR	#68					
1232	8F	69	STR	#69					
1233	8F	6A	STR	#6A					
1234	8F	6B	STR	#6B					
1235	8F	6C	STR	#6C					
1236	8F	6D	STR	#6D					
1237	8F	6E	STR	#6E					
1238	8F	6F	STR	#6F					
1239	8F	70	STR	#70					
1240	8F	71	STR	#71					
1241	8F	72	STR	#72					
1242	8F	73	STR	#73					
1243	8F	74	STR	#74					
1244	8F	75	STR	#75					
1245	8F	76	STR	#76					
1246	8F	77	STR	#77					
1247	8F	78	STR	#78					
1248	8F	79	STR	#79					
1249	8F	7A	STR	#7A					
1250	8F	7B	STR	#7B					
1251	8F	7C	STR	#7C					
1252	8F	7D	STR	#7D					
1253	8F	7E	STR	#7E					
1254	8F	7F	STR	#7F					
1255	8F	80	STR	#80					
1256	8F	81	STR	#81					
1257	8F	82	STR	#82					
1258	8F	83	STR	#83					
1259	8F	84	STR	#84					
1260	8F	85	STR	#85					
1261	8F	86	STR	#86					
1262	8F	87	STR	#87					

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1264	B1	3B	LDF	#1237	Y	1293	7B	09	LDF	#B0	2BD	
1265	4C	91	04	JMP	#0401	1294	5D	07	LD	#00	#E0B1	
1266	60	00	LDF	#1000		1295	49		PHR			
1267	0E	03	04	STL	#D400	1296	8D	07	CP	LDR	#E207A	
1268	04	02	STV	#00		1297	49		PHR			
1270	AC	FF	LD	#FF		1298	68		RTS			
1271	E2		JMP			1299	46	49	LDR	#49		
1273	8D	00	02	LDR	#0200	X	1300	4E	04	4B	LDR	#40C4
1276	20	07	BMI	#1250		1301	45	52	EDR	#52		
1278	C9	30	LDP	#30		1302	47		PHR			
1279	F8	F4	BEO	#127C		1303	05	41	CHP	#41		
1277	D3	AF	02	LDR	#E2AF	Y	1305	55		PHR		
1277	F8	DE	BEO	#125F		1306	52		PHR			
1281	5B	00	02	BHF	#B00	Z	1307	45	43	EDF	#43	
1284	D0	04	BNE	#123H		1308	42		PHR			
1286	C5		STV			1309	4C	05	52	JMP	#52C5	
1287	E2		JMP			1310	59	41	PHC	#170B		
1288	18	02	EPL	#127C		1311	42		PHR			
1290	C9	40	CHP	#40		1312	45	53	EDR	#53		
1291	F8	0A	BEO	#127C		1313	70	41	BVC	#1265		
1292	C7		STV			1314	43		PHR			
1293	E9	AA	E3	LDR	#E9AA	Y	1315	45	53	EDF	#53	
1295	10	FA	EPL	#127E		1317	50	41	BVC	#126A		
1294	0C	0B	DIC	#0B		1318	43		PHR			
129C	D0	D5	BNE	#1270		1319	45	53	EDF	#53		
129E	E0	1F	DIC	#1F		1320	50	41	BVC	#126F		
129A	18		DE			1321	47		PHR			
129B	10	F1	EPL	#127A		1322	45	00	EDR	#00		
1297	38	13	E3	JSS	#E343							

loaded to \$E300 ready for our machine code.

A little more explanation can help when you are writing your own routines, so let's look at the code in Figure 3.

The first six statements store the machine code command JMP #E343 in the GETCHR command to the operating RAM. The routine starts at \$A7F3 and it does not have increments of code so disassemble it using the monitor and walk out what it does. This is the routine which is so constant as when the computer is executing Basic routines. When you type (RETURN) after a direct command the operating system uses this routine to read your instructions.

Our new command started into the routine is called a wedge and will enable the computer to look out new commands before the operating system looks for a normal Basic command. If it finds one of our new commands our program will be executed, otherwise operation will be returned to the computer operating system. This wedge will make a slight difference to the speed of operation

but so small that you will not notice it and your normal Basic programs will still be able to work even when the routine is loaded.

The statements from LDA #E2 to BEO #127C move the machine code from \$E200 to \$E37F into high RAM from \$E380 to \$E3FF.

New values for the top of memory are loaded into the pointers at \$E3F4-37 and \$E3F5-38 finishing with a move RTS which returns us to the basic program to print the loader.

The rest of the machine code works from high RAM but for explanation I will refer to its low RAM location. However, after you've typed the

instructions routine and run the program to minimize at \$E300, you could disassemble from the new location for a closer view of what is happening.

The routine from \$E380 to \$E3E2 use the ROM and RAM contents (built with a Four Commodore, May-July '76). These will be moved to the tape buffer area (\$E300) by instructions \$E3E3 to \$E3E6 when the routines are retrieved.

\$E3E7 to \$E3E8 is the routine to enable high RAM to use sub-routines in its ROM (Four Commodore July '76).

\$E3E9 to \$E3EA checks if the computer is dealing with a direct command, if not the wedge returns the computer to the GETCHR routine with the JMP #E343 command.

\$E3EB to \$E3EC checks to see if the direct command is one of ours, if not it returns to Basic by the branch statement at \$E37E.

A list of the new commands is given from \$E3ED to \$E3F3, these are stored with the last letter shifted to a FIND is stored at \$E3F4-37 and finally \$E3F4-38 leaves a little space (page \$E38C to

PG. FROM SUBROUTINE															
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
01	00	01	00	02	00	03	00	04	00	05	00	06	00	07	00
08	00	09	00	0A	00	0B	00	0C	00	0D	00	0E	00	0F	00
10	00	11	00	12	00	13	00	14	00	15	00	16	00	17	00
18	00	19	00	1A	00	1B	00	1C	00	1D	00	1E	00	1F	00
20	00	21	00	22	00	23	00	24	00	25	00	26	00	27	00
28	00	29	00	2A	00	2B	00	2C	00	2D	00	2E	00	2F	00
30	00	31	00	32	00	33	00	34	00	35	00	36	00	37	00
38	00	39	00	3A	00	3B	00	3C	00	3D	00	3E	00	3F	00
40	00	41	00	42	00	43	00	44	00	45	00	46	00	47	00
48	00	49	00	4A	00	4B	00	4C	00	4D	00	4E	00	4F	00
50	00	51	00	52	00	53	00	54	00	55	00	56	00	57	00
58	00	59	00	5A	00	5B	00	5C	00	5D	00	5E	00	5F	00
60	00	61	00	62	00	63	00	64	00	65	00	66	00	67	00
68	00	69	00	6A	00	6B	00	6C	00	6D	00	6E	00	6F	00
70	00	71	00	72	00	73	00	74	00	75	00	76	00	77	00
78	00	79	00	7A	00	7B	00	7C	00	7D	00	7E	00	7F	00

EXEC for your own convenience when you write your own utility. (Actually the space will be in high RAM from 8010C to EXEC.)

The addresses of the new references (1) are stored as 16 bytes from 802E1 and 16 bytes from 802E7. Remember the stark note too to the position stored on the start, when a RTS is encountered in the program.

Notice that I've left parentheses before at the end of each line to enable you to add your own routines later.

If one of our new routines is required then its address is padded on in the stack at 81240 to 812A9 and this goes to the register containing the RTS at 812AA.

Entering the Code

We will now enter the code at the place where it normally exists.

Remember that before you start to enter the routine you will need to be in high RAM and you will need to alter its memory location 807E to to 840 so that RAM will be displayed rather than ROM. Figure 4 shows the steps for the ROM to routine addresses that will be readable for our program. Figure 5 is the **FIND** routine. Figure 6 gives the **MERGE** routine. Figure 7 gives the **ASSEMBLER** program.

When you have entered all the code, or at an intermediate stage if you like, save the program as follows:

(H) Type **QRETURN** to go back to Basic, then **NEW** (RETURN)

(H) **LOADUTILITIES?** if on tape
LOADUTILITIES? if on disk
DO NOT RUN

(L) Type **M(SHIFT) (RETURN)** to go into monitor
0047000 (that location 807E is 540)
 (L) Type **T LEX 8000 100** This will transfer our machine code to low RAM to join our Basic program
 (H) Return to Basic with **V (RETURN)**
 (H) Save with the normal instruction **SAVE UTILITIES? - tape**
SAVE UTILITIES? - disk

At the start of the next session **LOAD** and **RUN** the program in the normal Basic manner. Continue to enter the machine code from where you left off and, at the end, save as above.

Check Program

Remember that it is always good idea to save machine code programs before you run them in case you have made a typing mistake which makes the program hang. If you don't get a hang-up, press the **RUN/STOP** key and keep it pressed while you press the reset button. If you have difficulties, load the check program. Figure 8 **RUN** and check the values given in the table. Figure 9. This will enable you to find which routine has the mistake.

The machine code program that you have now entered is an aid to programmers. It contains three programs: **FIND**, **MERGE**, **ASSEMBLE**.

Procedure

It is a good idea to keep the programs in the first on a disk, when **SHIFTED RUN/STOP** will load and run the program. For a cassette system, load and run as the normal manner. You should see the title of the program which will have loaded into the top of RAM. The top of memory pointers will also have been lowered to protect the program. Basic programs can now be used as required. **FIND**, **MERGE** and **ASSEMBLE** will also be available.

FIND

This command will print all the Basic lines containing the sequence of characters following the command **F g**.

FIND PRINT will list all the lines in the program containing the word **PRINT**.

Note if you wish to search for a sequence that is inside brackets then you must put brackets after the command **FIND g**.

FIND *PRINT searches for the word **PRINT** inside brackets. It will find different keys to **FIND PRINT**.

MERGE

This routine will merge a program on disk with a program in memory. If the

FIG. 8 FIND ROUTINE

02000	00	00	00	00	00	00	00
02001	00	00	00	00	00	00	00
02002	00	00	00	00	00	00	00
02003	00	00	00	00	00	00	00
02004	00	00	00	00	00	00	00
02005	00	00	00	00	00	00	00
02006	00	00	00	00	00	00	00
02007	00	00	00	00	00	00	00
02008	00	00	00	00	00	00	00
02009	00	00	00	00	00	00	00
02010	00	00	00	00	00	00	00
02011	00	00	00	00	00	00	00
02012	00	00	00	00	00	00	00
02013	00	00	00	00	00	00	00
02014	00	00	00	00	00	00	00
02015	00	00	00	00	00	00	00
02016	00	00	00	00	00	00	00
02017	00	00	00	00	00	00	00
02018	00	00	00	00	00	00	00
02019	00	00	00	00	00	00	00
02020	00	00	00	00	00	00	00
02021	00	00	00	00	00	00	00
02022	00	00	00	00	00	00	00
02023	00	00	00	00	00	00	00
02024	00	00	00	00	00	00	00
02025	00	00	00	00	00	00	00
02026	00	00	00	00	00	00	00
02027	00	00	00	00	00	00	00
02028	00	00	00	00	00	00	00
02029	00	00	00	00	00	00	00
02030	00	00	00	00	00	00	00
02031	00	00	00	00	00	00	00
02032	00	00	00	00	00	00	00
02033	00	00	00	00	00	00	00
02034	00	00	00	00	00	00	00
02035	00	00	00	00	00	00	00
02036	00	00	00	00	00	00	00
02037	00	00	00	00	00	00	00
02038	00	00	00	00	00	00	00
02039	00	00	00	00	00	00	00
02040	00	00	00	00	00	00	00
02041	00	00	00	00	00	00	00
02042	00	00	00	00	00	00	00
02043	00	00	00	00	00	00	00
02044	00	00	00	00	00	00	00
02045	00	00	00	00	00	00	00
02046	00	00	00	00	00	00	00
02047	00	00	00	00	00	00	00
02048	00	00	00	00	00	00	00
02049	00	00	00	00	00	00	00
02050	00	00	00	00	00	00	00
02051	00	00	00	00	00	00	00
02052	00	00	00	00	00	00	00
02053	00	00	00	00	00	00	00
02054	00	00	00	00	00	00	00
02055	00	00	00	00	00	00	00
02056	00	00	00	00	00	00	00
02057	00	00	00	00	00	00	00
02058	00	00	00	00	00	00	00
02059	00	00	00	00	00	00	00
02060	00	00	00	00	00	00	00
02061	00	00	00	00	00	00	00
02062	00	00	00	00	00	00	00
02063	00	00	00	00	00	00	00
02064	00	00	00	00	00	00	00
02065	00	00	00	00	00	00	00
02066	00	00	00	00	00	00	00
02067	00	00	00	00	00	00	00
02068	00	00	00	00	00	00	00
02069	00	00	00	00	00	00	00
02070	00	00	00	00	00	00	00
02071	00	00	00	00	00	00	00
02072	00	00	00	00	00	00	00
02073	00	00	00	00	00	00	00
02074	00	00	00	00	00	00	00
02075	00	00	00	00	00	00	00
02076	00	00	00	00	00	00	00
02077	00	00	00	00	00	00	00
02078	00	00	00	00	00	00	00
02079	00	00	00	00	00	00	00
02080	00	00	00	00	00	00	00
02081	00	00	00	00	00	00	00
02082	00	00	00	00	00	00	00
02083	00	00	00	00	00	00	00
02084	00	00	00	00	00	00	00
02085	00	00	00	00	00	00	00
02086	00	00	00	00	00	00	00
02087	00	00	00	00	00	00	00
02088	00	00	00	00	00	00	00
02089	00	00	00	00	00	00	00
02090	00	00	00	00	00	00	00
02091	00	00	00	00	00	00	00
02092	00	00	00	00	00	00	00
02093	00	00	00	00	00	00	00
02094	00	00	00	00	00	00	00
02095	00	00	00	00	00	00	00
02096	00	00	00	00	00	00	00
02097	00	00	00	00	00	00	00
02098	00	00	00	00	00	00	00
02099	00	00	00	00	00	00	00

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X0004	09	78	00	00	20	00	00
X0005	00	20	00	00	00	00	00
X0006	01	40	00	00	01	00	00
X0007	08	00	00	00	00	00	00
X0008	20	00	00	00	00	00	00
X0009	00	00	00	00	00	00	00
X0010	00	00	00	00	00	00	00
X0011	00	00	00	00	00	00	00
X0012	00	00	00	00	00	00	00
X0013	00	00	00	00	00	00	00
X0014	00	00	00	00	00	00	00
X0015	00	00	00	00	00	00	00
X0016	00	00	00	00	00	00	00
X0017	00	00	00	00	00	00	00
X0018	00	00	00	00	00	00	00
X0019	00	00	00	00	00	00	00
X0020	00	00	00	00	00	00	00
X0021	00	00	00	00	00	00	00
X0022	00	00	00	00	00	00	00
X0023	00	00	00	00	00	00	00
X0024	00	00	00	00	00	00	00
X0025	00	00	00	00	00	00	00
X0026	00	00	00	00	00	00	00
X0027	00	00	00	00	00	00	00
X0028	00	00	00	00	00	00	00
X0029	00	00	00	00	00	00	00
X0030	00	00	00	00	00	00	00
X0031	00	00	00	00	00	00	00
X0032	00	00	00	00	00	00	00
X0033	00	00	00	00	00	00	00
X0034	00	00	00	00	00	00	00
X0035	00	00	00	00	00	00	00
X0036	00	00	00	00	00	00	00
X0037	00	00	00	00	00	00	00
X0038	00	00	00	00	00	00	00
X0039	00	00	00	00	00	00	00
X0040	00	00	00	00	00	00	00
X0041	00	00	00	00	00	00	00
X0042	00	00	00	00	00	00	00
X0043	00	00	00	00	00	00	00
X0044	00	00	00	00	00	00	00
X0045	00	00	00	00	00	00	00
X0046	00	00	00	00	00	00	00
X0047	00	00	00	00	00	00	00
X0048	00	00	00	00	00	00	00
X0049	00	00	00	00	00	00	00
X0050	00	00	00	00	00	00	00
X0051	00	00	00	00	00	00	00
X0052	00	00	00	00	00	00	00
X0053	00	00	00	00	00	00	00
X0054	00	00	00	00	00	00	00
X0055	00	00	00	00	00	00	00
X0056	00	00	00	00	00	00	00
X0057	00	00	00	00	00	00	00
X0058	00	00	00	00	00	00	00
X0059	00	00	00	00	00	00	00
X0060	00	00	00	00	00	00	00
X0061	00	00	00	00	00	00	00
X0062	00	00	00	00	00	00	00
X0063	00	00	00	00	00	00	00
X0064	00	00	00	00	00	00	00
X0065	00	00	00	00	00	00	00
X0066	00	00	00	00	00	00	00
X0067	00	00	00	00	00	00	00
X0068	00	00	00	00	00	00	00
X0069	00	00	00	00	00	00	00
X0070	00	00	00	00	00	00	00
X0071	00	00	00	00	00	00	00
X0072	00	00	00	00	00	00	00
X0073	00	00	00	00	00	00	00
X0074	00	00	00	00	00	00	00
X0075	00	00	00	00	00	00	00
X0076	00	00	00	00	00	00	00
X0077	00	00	00	00	00	00	00
X0078	00	00	00	00	00	00	00
X0079	00	00	00	00	00	00	00
X0080	00	00	00	00	00	00	00
X0081	00	00	00	00	00	00	00
X0082	00	00	00	00	00	00	00
X0083	00	00	00	00	00	00	00
X0084	00	00	00	00	00	00	00
X0085	00	00	00	00	00	00	00
X0086	00	00	00	00	00	00	00
X0087	00	00	00	00	00	00	00
X0088	00	00	00	00	00	00	00
X0089	00	00	00	00	00	00	00
X0090	00	00	00	00	00	00	00
X0091	00	00	00	00	00	00	00
X0092	00	00	00	00	00	00	00
X0093	00	00	00	00	00	00	00
X0094	00	00	00	00	00	00	00
X0095	00	00	00	00	00	00	00
X0096	00	00	00	00	00	00	00
X0097	00	00	00	00	00	00	00
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X0100	00	00	00	00	00	00	00

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character - they may disappear altogether. Lines that will give rise to problems should be spotted if the source program is listed before assembling. Lines can be protected by putting brace marks at the start of the line.

LD LDA 7

would give no problems.

(v) A defined variable or label, e.g. LABEL, when LABEL is defined somewhere in the program as indicated earlier.

Modifications or Operands

Operands may be modified by up to + or - 155 using instructions such as:

LDA LABEL+1

The IMMEDIATE and BYT have a further modification available:

LDA LABEL

will load the low byte of LABEL.

LDA LABEL

will load the high byte of LABEL.

BRANCH

Almost any code may be followed by an address (variable) when the program will calculate the size of the displacement or alternatively the programmer may calculate the displacement required.

BNE LOOP

means a branch to LOOP

BNE 6

means a branch of 16 from next opcode.

Errors

Details of errors are printed during assembly and also at the end of the assembly.

The address of labels are also printed at the end of the assembly.

FIG. 8 CHECK PROGRAM

```

100 J=0:EDD="A+DDE(17)
110 FORK=0:034=5000:
120 FORI=0:0127
130 SUM=0:0M=FORI(A+K)
140 NEXT I
150 PRINTHEX(1) TO "DEC(1A+127)" "SUM
160 END:100
170 NEXT K
    
```

Memory Allocation

(i) MOVE, FIND, MERGE, ASSEMBLER from 11,000 to 11,050

1st Assembler Source Language program as normal Base from 11000

(ii) Eight bytes of memory are required in-line with label used in the program. The labels are stored in RAM following the source program. Details of errors are stored after the label, each error needing three bytes of storage. No control characters have been incorporated in the ASSEMBLER program.

(iii) A small part of the machine tape buffer is used by the program, namely 8000 to 8002. This area should not be used for program location.

(iv) There is a protected area above ASSEMBLER which could be used for

machine code programs. This area is from 8001 to 8002F.

SAVING and LOADING

The in-built Plus/4 monitor may be used to save machine code programs, e.g.

>"PROGRAM" 5 7000 7100

would save from 7000 to 7100 under the name PROGRAM on to disk. To load from disk use LOAD "PROGRAM" 5 1

Source code programs may be saved and loaded as normal Basic programs.

That's it! Try it, you should find it very useful. E

FIG. 9 CHECK VALUES

8200 TO 824F	17875	8200 TO 824F	14840
8250 TO 82CF	18150	8250 TO 82CF	13243
8300 TO 834F	18460	8260 TO 82AF	14522
8350 TO 83CF	17870	8270 TO 82EF	14640
8300 TO 834F	15581	8280 TO 82FF	14815
8350 TO 83CF	14885	8290 TO 82CF	14267
8300 TO 834F	14218	8300 TO 834F	16063
8350 TO 83CF	12862	8310 TO 83CF	14830
8300 TO 834F	13496	8320 TO 83CF	12295
8350 TO 83CF	3086	8330 TO 83CF	17410
8300 TO 834F	11360	8340 TO 83CF	17846
8350 TO 83CF	11289	8350 TO 83CF	14901
8300 TO 834F	11090	8360 TO 83CF	16004
8350 TO 83CF	10127	8370 TO 83CF	16800
8300 TO 834F	11079	8380 TO 83CF	15369
8350 TO 83CF	8313	8390 TO 83CF	14908
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8350 TO 83CF	16385		

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Graphic Environment Operating System

Windows, Icons and Menus all form part of the new easy to use operating system that you can add to your C64 with GEOS

By Stuart Cooke

When first introduced to computers, people think to horror at the sheer number of commands that you need to know before you can get your computer to work. Take a look at the C64 with its complicated disk commands which no person to computers is going to remember straight away. It is therefore not surprising that someone has at long last come up with a product that will make communication between you, your C64 and its Commodore disk drive a lot easier and much more pleasant.

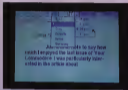
GEOS replaces many of the usual typed commands with a series of pictures, called *windows*, making handling of your input much easier. For example instead of having to type in the usual LOAD "name", drive secondary address command as you normally would with a C64 program, you simply have to move your pointer to the icon or 'picture' of the program that you require, select it by pressing the button next, choose LOAD from the appropriate menu and it's away you go.

Not only does GEOS support your

communication with your computer but rather gives you access to a whole host of facilities. For example you have fancy desk icons, a desk top which offers you facilities such as calculator and sheet clocks and a calendar. With the software supplied you also get a graphics program called *paint* - *GEOPaint* and a pseudo Wordprocessor called *GEOWrite*.

Perhaps the best way to describe the operation of the program is to refer to the picture accompanying the review.





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Next, you have a loaded 5.25 disk and you're still in GEOS with a display similar to that in photograph 1. The large area in the center of the screen shows what programs are on the disk in this drive — or rather a portion of the files on disk. If you look at the bottom corner of the "prog" you will find a "down" arrow; point to this and the next page of programs on the disk is shown. If you examine the items that move closer you will see that each of the files has a different picture associated with it. That enables you to see at a glance what type of program each one is. For example the picture with the palette is a graphics program — easy to tell!

Whether you save a program while using GEOS or the old and time-honored way (SAVE) is saved together with a small amount of text (you file). As you may already know (it's possible to protect files on a C64 disk, however Commodore didn't give any way to use this extremely useful facility), with GEOS you can now protect and separate files with ease.

Any C64 disk can be used with GEOS. Should you use one that hasn't been set up for use with GEOS, all of the files will be gone (in the case of an index card with a standard Commodore logo on it. That symbolizes an old-style C64 program. You do miss the option of turning your disks into GEOS disks and this doesn't alter the contents of your disk in at all but does take up some room. Changing a disk with GEOS is also extremely easy. Move the pointer to the disk (GEO) and press the button; the files now displayed on the screen will be those that are on the current disk in the drive.

Across the top of the area that is

used to display the contents of the disk currently being used you will find a series of icons. Should you move the pointer to one of these, the menu and "pull down" and the various options available are shown. Photograph 2 shows the GEOS menu. As you use the menu items a number of different commands are available, I will deal with each one in turn so that you know what is available.

GEOS

This menu is used to access a number of different desk accessories. You needn't have all of these available on the disk you are using, after all if you never use the calculator option then you may, as well, remove it from the disk structure so that you get more space for program storage. The options available on the standard GEOS disk when you access this menu are the PREFERENCE MANAGER which allows you to change the actual colors that are being used on the screen. You can alter the speed at which the pointer moves and you can also alter the design of the pointer. The preference menu is also where you set up the clock and the date for use within the program.

A calculator is also available which offers 11 functions. You can enter point to the numbers on the calculator that appears on the screen when you choose this option or you can simply use the keys which is far quicker.

A notepad with 10 pages is available for jotting down those important telephone messages and the list and photo managers allow you to transfer little pieces of artwork and text around different programs.

The printer that comes with each selected from the GPP menu. You must use a printer with graphics capabilities with GEOS since any program is actually produced as a graphics dump rather than using the printer characters set. This is a bit slower than printing straight text but does allow you to use numerous type styles and different fonts.

While on the subject of printers it's worth pointing out that to print any file you simply need to point to it and then move the now highlighted file to the printer icon at the bottom of the screen; the file will now be printed. It is also possible to create a file simply move the pointer to the trash bin icon.

File

The file menu is where you can start to manipulate your disk files. First on the list of commands from this menu is OPEN which simply LOADS and RUNS the selected file. DUPLICATE allows you to copy an existing file to one of a new name but on the same disk. Copying programs between disks is not much simpler. Select the file that you wish to copy. Move the icon below the file display area. Close the source disk and remove it from the disk drive. Place the new disk into the drive (select OPEN from the disk menu) move the icon of the file back into the display area and hit enter! Our copied file.

RENAME is the same except allows you to alter the name of any file on your disk. PRINT is the same as dragging the file to the printer — it prints out the contents of the selected file.

The INFO command is extremely interesting as it allows you to examine

specific information about the files on disk, this information includes:

- Name of the disk where the file is located
- The type of file — system application, etc.
- The permanent internal name of the file
- The file structure
- The size of the file
- The date and time that the program was last modified
- The name of the programmer
- Whether the program is write-protected or not

View

This option allows you to view the way in which the files are displayed on the display screen. One choice available is **ICON**, which displays the program with their icons, as in photos 1 and 2. You can also display the files alphabetically by name in the ordered list modification by size or by the file type.

Disk

This is where **GEOS** allows you to perform your general maintenance upon your disks. The first option is the menu **OPEN**. This will read the disk that is currently in the drive and display the directory on the screen in the form as specified in the view option. **CLOSE** is the opposite to this command and you should always **CLOSE** a disk before you remove it from the drive.

Copying a whole disk is made possible with the **COPY** command. This disk copy is considerably faster than other means and works extremely quickly. Single file errors can still be corrected and this will be

prompted to swap disks by the program, this may however take 25 swaps to copy a full disk. A **BACKUP** utility program is provided on the **GEOS** disk which will read only the six data swaps so is obviously much better.

A new disk obviously needs to be formatted before use. The **FORMAT** command allows you to do this with ease.

Quite often it is useful to be able to change the name that appears at the top of your disks. The **RENAME** command allows you to do this.

When you have used a disk for quite some time it is useful to be able to tidy the disk up and check it for errors. Normally you would use the standard Commodore Validator command to perform this. The **VALIDATE** option on the **DISK** menu performs the same job.

When you first load **GEOS** into the computer it is set up for single disk operation. The **ADD DISK** option enables you to use a second drive with **GEOS**, adding greater flexibility to the system and requiring fewer disk swaps.

Special

This is the menu that allows you to escape from **GEOS**. The options available allow you to perform a **RESET** of **GEOS** and bypass the disk **BASIC** screen, you may standard Commodore BASIC. To reload **GEOS** you simply have to make sure that the original **GEOS** is in the drive and hit the **RESTORE** key. This however will only work if you haven't run any programs that use the area of memory at which the **GEOS** bootstrap was (**FC000**).

The final option isn't of that much interest to UK users as it boots up a

communications program called **QUINS**. It is important to point out that **QUINS** is the one with an American communications system and cannot be used in the UK.

The Programs

As well as providing an exceptionally friendly front end to the disk menu **GEOS** also comes complete with two extremely powerful programs **GEOWRITE** and **GEOWRITE** (some people have referred to **GEOWRITE** as a wordprocessor but I think that this is going a little far). What **GEOWRITE** does do is allow you to enter text into your C64 in one of a number of available lines and add pictures that you have produced with **GEOPIC** and I have done the whole thing to your printer. Missing from the program are all of the usual things that you would expect from a wordprocessor such as search and replace, variable page lengths, different line spacing, etc. though you can change margins and tabs as per a typewriter.

GEOWRITE is extremely easy to use and should present no problems to anyone who would like to print out a letter or document. To start up the program you simply have to **OPEN** the **GEOWRITE** program by using the pointer **MOUSE** a quick double press on the button while pointing to the program performs the same function; you will then be asked if you want to create a new file or wish to edit an existing one, again all answers are equal via the pointer and controller. Once the necessary information has been entered you will find yourself in **GEOWRITE** already in the text editing mode.

Because the C64 does not display all its screen as one character — as it



printer produces the screen acts as a window onto a large piece of paper, writing as you move around the page. The ability to enter text where you want is particularly important when you want to add pictures that you have created from within **GEOPaint**. What's interesting (and you do not have to move about the processing of words as you would when using a typewriter) is the program has an automatic word wrap facility. This means that if a word will not fit on a line then the computer will automatically start it on the next line of the display for you. Across the top of your documents you will see a number of icons that become active when using **GEOS** as a font editor for your disks. As before you have the **GEOS** menu which offers you all of your desk top facilities such as collector etc.

FILE allows you to perform such operations as **SAVING** the file to memory, to later use, or simply copying the copy of the file that is on disk so that you can carry on working knowing that what you have already done is safely on disk.

No matter how proficient a typist you are or how good a writer, you are bound to make some mistakes. Thus the **EDIT** command. This option allows you to remove whole sections of text from the program or simply copy it elsewhere. This is extremely handy for re-organising the structure of your documents. Inserting text into a document is also extremely easy, simply move the pointer to the place where you would like to insert and it is done. You go!

The options menu has some extremely powerful commands within it. The first of these is the **PRE-VIEW FACIL** option. This shows on the screen a high-res picture of what the page will look like. Since the page is merely reduced in size, naturally implies that it does not give you an idea of what your finished page looks like so that you can make things around it necessary.

The second important option is **FACE PICTURES**. As previously mentioned, you can insert pictures from **GEOPaint** into your text. However, every time a picture is displayed on screen it is fetched from disk, slowing down the whole operation until it is almost unbearable. With this command all pictures are read from the screen and if **PRINT** or **SHOW PICTURES** is selected

Fonts

Numerous fonts are available for use with the wordprocessor and many of these are available in different sizes. For examples of the text available take a look at Figure 1 which contains a preview of some of the text. As well as being able to alter the type and size of the fonts you can also alter the style in which they are printed. The options available are **SOLID** (a normal font), **BOLD**, **ITALIC**, **DOTTED** and **UNDERLINE**. Again these are shown in Figure 1.

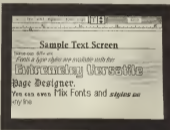
GEOPaint is extremely easy to use though it does have a couple of "quirks". For example if you select a new font and start typing, it takes a while for the program to load the new font from disk and then crash you a bit. This quite often means that you have typed a lot of text that the program has not printed, the way around this is simply to wait some time when changing fonts.

Typing letters and documents can now be made more interesting by using two styles and graphics. However, I don't think that you would find too many people who would like to use the program on an every day basis as wordprocessors, too many times, are missing. It is however great fun.

Geopaint

The program supplied with **GEOS** allows you to create your own charts, tables, or other graphics for inclusion within any text or you can even design pictures that will occupy a full sheet of printer paper. The program has two modes of operation, 16 colour mode and mono mode. The colour mode allows you to access the full colour capabilities of the C64, any picture being produced as a sheet of grey. The mono mode allows just two colours, which is far better and clearer for pictures that are to be printed out. After all a printer only has two colours, black and white. If you have ever used a graphics program that you will be pleased to know that all of the options that you would expect from a professional graphics program are present.

A point to read for the detailed form around the screen and a brush is used for painting in large areas. When using a brush it is possible to select the actual shape that the brush takes and what pattern it leaves behind it. A computer brush does not leave a solid wash of paint, it can have behind it features such as checks or bricks. In fact any of 12 different patterns. Should you simply wish to shade an area of your drawing, then the



are fresh as you likely what you require. The picture random dots on the screen, the longer you hold it on a particular area the more dots you get.

Filling an area of the screen is made particularly easy with the **Fill** option. Point to the picture of the top and then to any area on the screen and the area will be rapidly filled with the chosen pattern. The **Fill** is extremely fast and is one of the best that I have seen in a CGM graphics program.

Options exist for drawing straight lines, the measurements of which are given at the bottom of the screen in a handy readout. There is also a ruler option that allows you to measure distances on the screen upon the figures appear at the bottom of the screen.

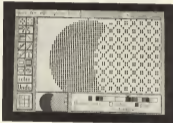
Shapes

Options exist for producing squares and circles with either filled or open centres and both are extremely quick. It would have been nice to see options for other shapes as well such as triangles or ellipses although you can draw these with the pencil and line options, should you need them, and then fill them in using the **Fill** option.

Not only can you copy a picture onto a text file but you can also add text into a picture. This is useful for adding text to graphs, labelling pictures or simply having your mark on your latest masterpiece. As with the word processor you can choose the text style and font that you require. All text is entered in rectangular text regions. The actual dimensions of the region being under your control. You can even move a figure and alter its dimensions when it has text in it, the text reformating itself to fit the new area.

Don't Panic

As with all good graphics programs, a safety device is available which will recover the state of your picture before the last command. This is extremely useful if you make a mistake such as filling in your whole picture with a pattern. Also whenever the wrong area of the page is moved, the whole picture is stored so that you can usually get a fairly recent version of your artwork back from disk, with the **RECOVER** option. Should you make real errors then you can use the **ERASE** to rub them out.



Getting Larger

A zoom facility is available which makes it extremely easy to add fine detail to your picture. One extremely nice touch is the way that you can always see an actual size picture of any enlarged area at the bottom of the screen.

Areas

It is possible to subdivide rectangular areas of the screen in a number of ways. You can select them, rotate them, copy them, move them and even wipe them clear.

As with the Wordprocessor only a small area of the screen is displayed at once, the **PREVIEW** option again displays the whole page in small detail so that you can see what the finished product looks like.

GEOPART is one of the better graphics programs that I have used. The fact that you can only see a small area of the screen is not all a坏事 since it first but is quite easy when you go used to it. The fact that you only see a small area of the screen at once does mean that you can get more detail into your pictures than is available with most other graphics programs since they generally only work with an area the size of the screen.

Verdict

GEOS provides an extremely easy way to interface for the CGM and a disk drive. Myself, I would probably prefer to use

the old style Commodore commands for **LOADING** and **RUNING** disk programs, though I must admit I have been using them for quite some time. Having shown **GEOS** to a number of computer novices it is clear that they found **GEOS** both quick and easy to use. The programs supplied are extremely powerful and should provide both experienced users and people who are just playing around with some quite satisfying and professional results.

GEOS doesn't end here however. An enhancement is really a new way of communicating with your CGM and disk drive. Numerous new programs are in the pipeline that will be based around the **GEOS** base and. These include a professional wordprocessor and database, a host of new fonts and a set of new disk utilities including a calculator generator, an editor that will allow you to change the screen to suit your own applications, an art generator that will allow you to map graphics with other commercial programs and even a game of **Blackjack**.

If the forthcoming programs can manage to maintain the same ease of use as the ones provided with the program, then **GEOS** is certainly a winner.

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... (small text regarding software prices and availability)

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Captain Competition

New software buyers. Codemasters (see Data Services) seem to be having a bit of trouble keeping up with life in the fast lane of the software industry!

Darings Richard, Jim and David look as if they're heading for some chills and spills. The transportation editor on Four Commodore couldn't think of a captain to go with that picture so we decided to let our respected readers have a go at that lovely problem. If you think of the best one then you'll get a crappy free for your trouble which you may even want to spend on Code Master and Twin Lead your entry to Your Commodore Captain Competition, 1 Golden Square, London W1R 3AB. Closing date: Monday 29 December 1985.

Dagold

In the November issue of the magazine we stated that it was possible to SAVE the Disk Utility which was on the floppy coming on to your disk by simply pressing RIN/STOP and RESTORE and then performing a normal SAVE operation. However, it appears that the turbo which was used to generate the cassette has altered some of the pointers within the program making it impossible to SAVE using the above method. Should you wish to make a copy of the program on your own disk then you can use either of the following methods:

1) Use a machine code monitor to SAVE the program out. The start address of the program is `00000000` and the end address



Have You Won?

Here are the 20 winners of our Global Software Competition. The five top prize winners are: Mike Rens, Mike, Mike, D Larkin, RENE, Mark Gwynn, Derby, Mark Parry, Morpeth, Vassilios Vangelis, Athina. They will all receive a copy of Magnate's Ball Room Global Software plus a copy of Global's Crusader program. The 15 runners up will receive a copy of Magnate's Ball. They are: J. Naud, Orlan, Belgium, Chris

Garbutt, Brandon, Steven Cohen, Kottarag, John Paul Dewhurst, Ben Martin, Birmingham, Michael Swain, Leeds, Tom Carter, Doocton, Louise Cochrane, Chilton-on-Sea, Richard Dwyer, Carlos Simon McMorris, Havrestead, S.E. Williams, Shefffield, Wayne McComber, J.M.J White, Belfast, Steven Dutton, Devonport, Mark Fleming, Milton

2) This is the easiest method if you don't understand machine code. When the program is running, press the RIN/STOP and RESTORE keys at the same time. The computer will now return to the READY prompt. Now enter the following line:

```
POKE#16,POKE#16 POKE#16,162
POKE#16,79:SAVE"Diskutil".*
```

You will now have a copy of the program on disk.

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